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FOOD TECHNOLOGY ABSTRACTS

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ABBREVIATIONS

A	ampere
AAS	atomic absorption Spectrometry
abstr.	abstract
ad lib.	ad libitum
ADP	adenosine diphosphate
Anon.	Anonymous
AOAC	Association of Official Analytical Chemists
approx.	approximately
atm	atmosphere
ATP	adenosine triphosphate
a_w	water activity
BHA	butylated hydroxyanisole
BHT	butylated hydroxytoluene
BOD	biological oxygen demand
b.p.	boiling point
Btu	British thermal unit
c-	centi- [as in cm, cm^2, cm^3]
cal	calorie
cd	candela
Ci	curie
CMC	carboxymethyl cellulose
COD	chemical oxygen demand
coeff.	coefficient
conc.	concentrated
concn.	concentration
cv.	cultivar
cwt	hundredweight
d-	deci-
DE	dextrose equivalent
detn.	determination
DFD	dark firm dry
diam.	diameter
dil.	dilute
DM	dry matter, Deutsche Mark
DNA	deoxyribonucleic acid(s)
dyn	dyne
E.	East, Eastern, etc
ECD.	electron capture detection
EDTA	ethylenediaminetetra acetic acid
Eh	oxidation-reduction potential
ELISA	enzyme-linked immunosorbent assay
f-	femto-[10^{-15}, as in fCi]
°F	degree Fahrenheit
FAO	Food and Agricultural Organization
FDA	Food and Drug Administration
FID	flame ionization detection
fl oz	fluid ounce
f.p.	freezing point
ft	foot, feet
g	gram
GC	gas chromatography
gn	gravity
gal	gallon
gf	gram-force
GLC	gas-liquid chromatography
h	hour
ha	hectare
HDPE	high density polyethylene
hl	hectolitre [100 l]
hp	horse power
HPLC	high performance/pressure liquid chromatography
HTST	high temperature short time
Hz	hertz [frequency cycle/s]
in	inch
IR	infrared
IU	international unit
J	joule
k-	kilo- [as in kcal, kg]
K	Kelvin
l	litre
lb	pound
lb	pound-force
LDPE	low density polyethylene
m-	milli- [as in mg, ml, mm]
m-equiv	milli-equivalent
m	molar concentration
M-	mega- [as in Mrad]
max.	maximum
min	minute [time]
min.	minimum
mol	mole
mol.wt	.molecular weight
m.p.	melting point
MPN	most probable number
MS	mass-spectrometry
n-	nano-[10^{-9}, as in nm]
N	Newton [kg m/s^2]
N.	North, Northern, normal concentration
NMR	nuclear magnetic resonance
NPU	net protein utilization
oz	ounce
p-	pico- [10^{-12}, as in pCi]
P	poise
P	probability
Pa	Pascal [N/m^2]
PAGE	polyacrylamide gel electrophoresis
PER	protein efficiency ratio
p.p.b.	parts per billion
p.p.m.	parts per million
PSE	pale soft exudative
PTFE	polytetrafluorethylene
PVC	polyvinyl chloride
PVDC	polyvinylidene chloride
qt	quart
R	rontgen
rad	rad or radian
ref.	reference(s)
rev/min	revolutions per minute
RH	relative humidity
RNA	ribonucleic acid(s)
S.	south, Southern, etc.
s.d.	standard deviation
SDS	sodium dedecylsulphate
s.e.	standard error
s	second [time]
SNF	solids-not-fat
sp.,spp.	species
sp.gr.	specific gravity
summ.	summary
Suppl.	Supplement
t	metric tonne
temp.	temperature
TLC	thin layer chromatography
TS	total solids
UHT	ultra-high temperature
UV	ultraviolet
V	volt
var.	variety
vol.	volume
v/v	volume/volume
w	watt
W.	West,Western,etc.
WHO	World Health Organization
w/v	weight/volume
wk	week
wt.	weight
yd	yard
yr	year
µ	micro-[as in g, m]
%:	per centum
>	greater than
≥	greater than or equal to; not less than
<	less than
≤	less than or equal to; not greater than

Chemical symbols are used for all elements

ABBREVIATIONS FOR LANGUAGES

Language of text

Dutch	Nl
French	Fr
German	De
Italian	It
Japanese	Ja
Norwegian	No
spanish	Es
swedish	Sv

GENERAL

2159

Pal (S). **Agricultural exports of India: Issues of growth and instability.** *Indian Journal of Agricultural Economics* 47(2): 1992: 185-194

This study examines (i) the magnitude of growth and instability in agricultural exports, (ii) the determinants of the exports of agricultural products, and (iii) the causes of instability in export earning. The study is based on time series secondary data pertaining to the period 1970 to 1989. The data for principal agricultural export products and product aggregates for India and the world were compiled from FAO Trade Year Book. Data on domestic wholesale price indices and net national product were taken from Agricultural Prices in India and Economic Survey, respectively. The study reveals that the export of agricultural products was constrained by the increasing domestic demand. Further, the volatile world prices and policy changes have induced a very high degree of instability in the export earnings from important agricultural products. The results failed to establish any relationship between the nature of product, growth and instability in exports. KAR

FOOD PROCESSING

Nil

FOOD PACKAGING

Nil

FOOD ENGINEERING AND EQUIPMENT

2160

Pham (QT). **Shape factors for the freezing time of ellipses and ellipsoids.** *Journal of Food Engineering* 13(3): 1991: 159-170

By assuming that the freezing front is similar in shape to the surface, an expression is obtained for the shape factors of ellipses and ellipsoids. This expression agreed well with numerical results for the case of infinite Biot number but disagreed by up to 17% for intermediate Biot numbers. A curve-fitting expression is proposed that agrees with numerical results to within 6%. AS

2161

Paul Singh (S), Srivastava (AK) and Steffe (JF). **Vibration induced settling of a sphere in a Herschel-Bulkley fluid.** *Journal of Food Engineering* 13(3): 1991: 181-197

Settling of spheres suspended in a Herschel-Bulkley fluid with a yield stress under the influence of vibrations is of great practical significance while transporting liquid food systems such as soups, sauces and jams. A dimensionless equation has been developed to predict the settling time of a sphere in a Herschel-Bulkley fluid subjected to sinusoidal vibration. The model was used to determine the effect of random vibrations as induced in a shipping environment. A separation criterion has been developed to determine whether a particle will settle. Methods described in this paper can also be used to characterize non-Newtonian fluids. AS

2162

Marcotte (M), Toupin (CJ) and Maguer (ML). **Mass transfer in cellular tissues. Part I: The mathematical model.** *Journal of Food Engineering* 13(3): 1991: 199-220

The kinetics of equilibration of a biological structure with osmotic sol. were studied based on the internal cellular structure of the plant material. The model developed by Toupin was used to describe the mass transfer of sucrose and water in potato material. This model was modified to give a closer thermodynamical description of the forces involved in the osmotic process. The model was used to simulate movement of water and sucrose in potato tubers. AS

2163

Yeo (H) and Shibamoto (T). **Effects of moisture content on the Maillard browning model system upon microwave irradiation.** *Journal of Agricultural and Food Chemistry* 39(10): 1991: 1860-1862

Browning intensities of an L-cysteine/D-glucose model system with different moisture content (MC) (0 - 40%) upon microwave irradiation for 2.5 min at the high setting of a 700-W microwave oven were measured by a UV spectrophotometer at 420 nm. The volatile compounds generated were analyzed by GC and MS. Max. bowning intensity occurred at approx. 14% moisture. The effects of irradiation time for each of the MC (14, 22 and 26%) were also investigated. For these MC, browning increased with irradiation time until reaching a plateau at 2.5 min of irradiation. The MC appeared to determine the browning intensity at the initial stage of exposure to microwave irradiation. The max. number of volatiles was produced at 11% moisture. Major compounds obtained from this model system

were 2-thiophenethiol, 2,3-dihydro-3,5-dihydroxy-6-methyl-4H-pyran-4-one, and 2-acetylfuran. AS

2164

Kanawjia (SK), Pathania (V) and Singh (S). **Microencapsulation of enzymes, microorganisms and flavours and their applications in foods.** *Indian Dairyman* 44(6): 1992: 280-287

The advantages of microencapsulation technique in preserving the sensory attributed have been delineated. Phase separation method, interfacial polymerization method, liquid drying method and liquid surfactant membrane method are described under microencapsulation of enzymes. Microencapsulation of *B. pseudolongum* is described in detail and a brief description about encapsulation of *Tetrahymena pyriformis* and *Escherichia coli* is given. Spray drying is the method described for microencapsulation of flavours. The review ends with a note on food application of microencapsulation technique. KAR

2165

Fuchs (M), Kluge (S), Ruter (M), Wolff (E) and Piringer (O). **Global migration determination and sensory evaluation of microwaveable materials coming into contact with food (Part I).** *Deutsche Lebensmittel-Rundschau* 87(9): 1991: 273-276 (De)

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

2166

Lovaas (E). **Antioxidative effects of polyamines.** *Journal of the American Oil Chemist's Society* 68(6): 1991: 353-358

The antioxidative effects of spermine, spermidine and putrescine were determined by measurement of primary and secondary oxidation products of polyunsaturated fatty acids (PUFAs), using gas and liquid chromatography as well as spectrophotometric recordings. It was demonstrated that polyamines inhibit the oxidation of PUFAs, α-tocopherol and carotenoid pigments. Both linear and nonlinear dose/response relationships have been observed. The efficiency of a given polyamine was correlated with the number of amine groups in the mole. Spermine was, thus, more efficient than spermidine, which in turn had a higher efficiency than putrescine. The relative antioxidative effect was as follows: spermine (100.0), spermidine (61.0), putrescine (23.0), ethoxyquin (27.6), ascorbyl palmitate (18.3), octyl gallate (7.9), TBHQ (6.3), BHA (3.6) and α-tocopherol (3.4). AS

Chemistry (Analytical)

2167

Andrikopoulos (NK), Brueschweiler (H), Felber (H) and Taeschler (Ch). **HPLC analysis of phenolic antioxidants, tocopherols and triglycerides.** *Journal of the American Oil Chemist's Society* 68(6): 1991: 359-364

Triglycerides, together with 9 synthetic phenolic antioxidants most commonly used to prevent oxidation of edible oils and fats, as well as the natural antioxidants tocopherols and α-tocopherol acetate, were separated by HPLC by means of a reversed phase C_{18}-column and gradient elution with water/acetonitrile/methanol/isopropanol. Besides dilution of the oil with isopropanol/hexane, no further example preparation was required. UV detection was applied. The synthetic antioxidants propyldodecylgallate, octyldodecylgallate, dodecylgallate, 3-tert-butyl-4-hydroxyanisol, tert-butylhydroquinone, 3,5-di-tert-butyl-4-hydroxytoluene, 2,6-di-tert-butyl-4-hydroxymethyl-phenol, 2,4,5-trihydroxybutyrophenone and nordihydroquaiaretic acid, as well as α- and δ-tocopherol and α-tocopherol acetate were base-line separated; β- and γ-tocopherol, however, eluted together. The triglycerides, detected at λ = 215 nm, were separated according to their partition number. The absorption at λ = 215 nm revealed saturated and unsaturated triglycerides. The absorption at λ = 280 nm indicated triglycerides with conjugated unsaturation, relating information about refining and heat treatment of the oil. Oxidized unsaturated triglycerides showed absorption at λ = 230 nm. Triglycerides of ricinoleic acid, a hydroxymonounsaturated acid, gave identical UV spectra. The simultaneous detection of antioxidants and triglycerides may be used to study inhibition effects by antioxidants in oils. AS

2168

Cameron (RG), Buslig (BS) and Shaw (PE). **Adaptation of a spectrophotometric assay for pectinmethylesterase to a kinetic microplate reader.** *Journal of Food Science* 57(4): 1992: 1006-1008

A continuous spectrophotometric assay for pectinmethylesterase (PME) has been adapted to a kinetic microplate reader. Linear standard curves could be constructed from 0 to 50 nMol galacturonic acid and remained linear for 15 min. Activity estimates from commercial orange peel PME were accurate from 0.009 to 0.015 units. Comparison of microplates with differing protein binding efficiencies indicated that low and medium binding plates showed significantly higher activity levels than high binding plates. The utility of the assay was demonstrated on 2 commercial mixtures of pectolytic enzymes and 2 commercial PMEs. The assay is extremely rapid; 24 samples replicated 3 times each could be performed in < 1 h. Additionally, it requires very small volumes of substrate (final vol. per well was 200 µL) and sample (< 10µL per well). AS

2169

Weisshaar (R). **Improved method for the determination of ^{89}Sr and ^{90}Sr in food.** *Deutsche Lebensmittel-Rundschau* 87(5): 1991: 142-144 (De)

A new method for the detn. of ^{89}Sr and ^{90}Sr in food is presented. For that purpose, Ca and strontium are precipitated as oxalates, transferred into chlorides and dissolved in an excess of EDTA at pH 10 - 11. The excess of EDTA is removed by titration with $ZnSO_4$. Ba^{++} is added as indicator. At the endpoint no more excess of EDTA is present and $BaSO_4$ precipitates. After this, a slight excess of $ZnSO_4$ is added and $SrSO_4$ precipitates, while Ca completely remains in sol. After separation of barium, a $SrSO_4$ measuring preparate is made and used for beta counting and calculation of ^{89}Sr- and ^{90}Sr-activities. The method agrees very good with the classical nitric acid method, but it is less time consuming and avoids handling with fumic nitric acid. AS

2170

Brauer (B) and Funke (T). **Determining primary aromatic amines in migratory solutions.** *Deutsche Lebensmittel-Rundschau* 87(9): 1991: 280-281 (De)

Primary aromatic amines, being able to migrate from plastics into foodstuffs, can be tested as a sum by an official method. The amines available in an aqueous food simulant are coupled to an azo dye, and the content is determined photometrically. The official procedure is improved with regard to sensitivity by the method described. In addition to the official procedure it contains a preconcentration of the hydrophobic azo dye to C18 solid phase extraction columns. The method is validated for the food simulants deionized water, 3% acetic acid and 10% ethanol. AS

FOOD MICROBIOLOGY AND HYGIENE

Enzymes

2171

Leuchtenberger (A). **Current facilities of enzyme application in food production. Part II. Special application fields.** *Ernahrungsforschung* 36(1): 1991: 12-13 (De)

Some special fields of application which make necessary the use of single or combined enzyme preparations are the isolation or intensification of aroma and taste substances, the production of protein hydrolysates for special dietary and therapeutic preparations as well as the preservation of foods (extraction of essential nutrients, formation of antiseptic compounds, degradation of microbial cell walls, use of killer enzymes). AS

Microorganisms

2172

Knabel (SJ), Walker (HW) and Hartman (PA). **Inhibition of *Aspergillus flavus* and selected gram-positive bacteria by chelation of essential metal cations by polyphosphates.** *Journal of Food Protection* 54(5): 1991: 360-365

A simple well-plate technique was utilized to determine the effect of various metals on the growth of microorganisms in media containing different polyphosphates. *Aspergillus flavus* and 4 gram-positive bacteria were completely inhibited by media containing 1% of various alkaline polyphosphates, whereas 4 gram-negative bacteria were not. Significant differences were observed between the type of polyphosphate added, the type of metal added, and the species of gram-positive bacterium inhibited. The addition of Mg^{2+} stimulated growth of *A. flavus* and *Bacillus cereus* in the presence of tetrasodium pyrophosphate, whereas Mn^{2+} permitted growth of *A. flavus* and *Staphylococcus aureus* in the presence of sodium hexametaphosphate. Iron supplementation allowed the growth of *S. aureus* and *Listeria monocytogenes* on media containing 1% tetrasodium pyrophosphate. A method for determining the amount of Ca and Mg in water was modified to detect free Mg^{2+} by replacing EDTA with phosphate. The addition of free Mg^{2+}, but not Mg^{2+} chelated by tetrasodium pyrophosphate, permitted the growth of *B. cereus* on a medium containing tetrasodium pyrophosphate. It is speculated that polyphosphates specifically inhibited *A. flavus* and gram-positive bacteria by removing essential metals

from cation-binding sites located within their cell walls. AS

2173

Byrne (RDJr) and Bishop (JR). **Evaluation of a dry medium culture plate (3M Petrifilm AC) for laboratory pasteurized counts.** *Journal of Food Protection* 54(4): 1991: 308-309

In this study Petrifilm AC was evaluated for its ability to enumerate thermoduric bacteria in raw milk by the laboratory pasteurized count (LPC). LPC's were conducted on agar pour plates and Petrifilm plates. Both plating techniques were conducted immediately following laboratory pasteurization, and plating was also conducted after incubations of 2 and 4 h at room temp. Uninoculated raw milk samples, raw milk inoculated with *Bacillus cereus*, *Micrococcus luteus* and raw milk isolates (*Streptococcus*, *Corynebacterium*, and *Micrococcus* sp.) were enumerated. A total of 270 samples was analyzed. Uninoculated raw milk samples and raw milk samples inoculated with *B. cereus*, *Corynebacterium*, *Streptococcus*, and some *Micrococcus* sp. showed no significant difference between agar pour plates and petrifilm AC. Other *Micrococcus* species were recovered at lower numbers on the Petrifilm after laboratory pasteurization. Some of these were comparable to the agar plates after a 4-h incubation at room temp. This study indicates that Petrifilm AC could be used in place of agar pour plates to conduct the LPC. AS

Bacteria

Aeromonas

2174

Ramteke (PW), Pathek (SP) and Bhattacharjee (JW). **Incidence of *Aeromonas* in total coliform test.** *Indian Journal of Microbiology* 32(2): 1992: 193-196

Drinking water samples (341) collected from different districts of N. India were analysed for total coliforms and recovery of coliform sp. and *Aeromonas* in multiple tube test. *Escherichia coli* and *Aeromonas* formed 12.4% and 32.6% of total coliforms identified. The presence of aerogenic *Aeromonas* elevated the total coliform concn. in drinking water. The authors stress the importance of determining the *Aeromonas* in the total coliform test as the *Aeromonas* proved to be an important pathogen in a variety of infections in humans. GS

Bacillus cereus

2175

Harmon (SM) and Kautter (DA). **Incidence and growth potential of *Bacillus cereus* in ready-to-serve foods.** *Journal of Food Protection* 54(5): 1991: 372-374

To simulate temp. abuse, 106 test portions of ready-to-serve moist foods, 12 test portions of rehydrated powdered infant formula, and 18 test portions of nonfat dry milk were incubated for 20 and 24 h at 26 C, and then examined for *Bacillus cereus*. Of the ready-to-serve moist foods, 88 of 106 were positive for *B. cereus* at levels ranging from 0.25 to 8.5×10^6/g after 20 h of incubation and from 0.1 to 58×10^6/g after 24 h. All the powdered milk and 12 of the 15 units of infant formula, representing 5 brands, were positive, with counts ranging from 0.15 to 5.0×10^6/g in 20 h and 5.0 to 49×10^6 after 24 h. *B. cereus* counts in the powdered products were low, ranging from 0.09/g for one of two soy-based products to an average of 0.29/g for milk-based products. However, these levels were sufficient to initiate growth of *B.cereus* in almost every 2-oz serving. Similar results were obtained for rehydrated nonfat milk, with initial *B. cereus* counts ranging from 0.29 to 1.5/g; at 26 C the counts averaged 3.3×10^7 after 20 h and 5.5×10^7 after 24 h. Counts ranged from 2.0×10^4 to 1.1×10^5 after 9 h in milk and were in excess of 10^6g after 10.5 h. AS

2176

Szabo (RA), Speirs (JI) and Akhtar (M). **Cell culture detection and conditions for production of a *Bacillus cereus* heat-stable toxin.** *Journal of Food Protection* 54(4): 1991: 272-276

In rice, milk, and brain-heart-infusion cultures, 17 of 67 *B. cereus* strains produced a heat-stable toxin causing morphological changes in cultures cells. All of the positive strains were associated with illness, 8 with the emetic syndrome. Time-temp. studies indicated that toxin production was optimum at 25 to 30 C after 18 h in shaking culture, but low levels were produced at 15 C. Effects in cells included granulation, vacuole formation, cell rounding, acid production, and arrested cell multiplication. Of 7 cell lines tested, Int 407, CHO, and HEp-2 were equally the most sensitive with the former being preferred for ease of interpreting results. The observed toxin had a mol. wt. of about 14,000 and a pI of 5.9 as determined by Superose 12 chromatography and Mono P ion-exchange chromatofocusing, respectively. AS

Clostridium botulinum

2177

Okereke (A) and Montville (TJ). **Bacteriocin inhibition of *Clostridium botulinum* spores by**

lactic acid bacteria. *Journal of Food Protection* 54(5): 1991: 349-353, 356

Twenty-three strains of lactic acid bacteria were tested by deferred antagonism methods for bacteriocin-like activity against types A and B spores from 11 proteolytic and nonproteolytic *Clostridium botulinum* strains. *Pediococcus pentosaceus* ATCC 43200, *P. pentosaceus* ATCC 43201, *Lactococcus lactis* subsp. *lactis* ATCC 11454, *Lactobacillus acidophilus* N2, *L. plantarum* LB75, *L. plantarum* LB592 and *L. plantarum* BN exhibited bacteriocin-like inhibition of all *C. botulinum* strains tested. By excluding inhibition due to hydrogen peroxide, acid, and lytic phage and confirmed their proteinaceous nature, the inhibitors were confirmed as bacteriocins. The min. inhibitory cell concn. (MICC) required to produce 1 mm radius inhibition zones were determined by direct antagonism testing. Only strains 43200, 43201, 11454, and N2 were inhibitory when cultured simultaneously with the botulinal spores. The MICCs of strains antagonistic to *C. botulinum* spores by simultaneous testing ranged between 1.6×10^5 and 4.7×10^7 CFU/ml. Based on the MICCs, *P. pentosaceus* 43200 was most inhibitory to *C. botulinum*. AS

Escherichia coli

2178

Hsü (H-Y), Chan (SW), Sobell (DI), Halbert (DN) and Groody (EP). **A colorimetric DNA hybridization method for the detection of *Escherichia coli* in foods.** *Journal of Food Protection* 54(4): 1991: 249-255

A colorometric DNA hybridization assay has been developed for the rapid detection of *E. coli* in foods. The method employs two oligonucleotide probes which are specific for the 16S ribosomal RNA of *E. coli*. Probes are added to lysates of test cultures and allowed to hybridize to target rRNA if present. The probe-target complex is captured via hybridization to a polystyrene dipstick. The immobilized target is detected using an antibody complex generates a colorimetric signal when exposed to a substrate/chromogen mixture. A total of 233 *E. coli* isolates representing typical, toxigenic, invasive, hemorrhagic serotype 0157:H7, and other pathogenic strains all resulted in a positive assay signal. Dose-response experiments indicate the sensitivity of the assay is approx. 1×10^6 CFU/ml. Specificity of the assay was determined by testing 207 strains of non-*E. coli* species at 10^9 CFU/ml. All of the non-*E. coli* organisms tested were negative with the exception of *E. fergusonii* and *Shigella* sp. A total of 345 enriched samples including inoculated, uninoculated and naturally-contaminated foods was tested for the presence of *E. coli* by the hybridization assay and the conventional cultural method. The false-negative rate for the hybridization assay was 1.2%. By comparison, the false negative rate for the culture method in these studies was 23.4%. Based on these data, the DNA hybridization method is significantly more accurate than conventional methods for the detection of *E. coli* in foods. AS

Listeria monocytogenes

2179

Evason (DJ), Klatt (MJ), Donlevy (TP) and Flowers (RS). **Agar-based 24-H method for presumptive identification of *Listeria monocytogenes*.** *Journal of Food Protection* 54(5): 1991: 370-371

A rapid system for the presumptive identification of *L. monocytogenes* was developed using agar-based media in place of conventional liquid media. The system allows detn. of oxidase, catalase, rhamnose and xylose fermentation and CAMP reaction within 24 h. A single four-section compartmented petridish was prepared containing purple agar base with xylose, purple agar base with rhamnose, trypticase soy agar with yeast extract (TSA/YE), and TSA/YE with 5% sheep blood. All four media and a 10-ml portion of brain heart infusion broth, to examine motility, were inoculated simultaneously from a single colony for presumptive identification. A 100% correlation between conventional procedures requiring 7 days and the rapid system was demonstrated on 935 *L. monocytogenes* cultures isolated from food and food plants. The rapid screening test was also useful in differentiating other *Listeria* spp. AS

Streptococcus cremoris

2180

Sridhar (N) and Dutta (SM). **Immobilization of β-galactosidase of *Streptococcus cremoris* (H).** *Indian Journal of Dairy Science* 44(8): 1991: 514-518

β-Galactosidase of *S. cremoris* (H) was immobilized on porous glass beads. Higher activity yield was recorded with porous glass beads having a pore diam. of 350-400A°. A linear relationship was observed between the amount of enzyme immobilized and the enzyme used for immobilization. The optimum temp. for the immobilized enzyme was found to be 50 C. The immobilized enzyme was found to be stable over a wide pH range (5-9). The immobilized enzyme beads packed in a column exhibited a hyperbolic relationship between the flow rate and hydrolysis of ONPG. Apparent Km value for the immobilized enzyme with ONPG as the substrate was observed to be 4mM and with lactose it was found to be 38mM. AS

Fungi

Aspergillus

2181

Thompson (DP). **Effect of butylated hydroxyanisole on conidial germination of toxigenic species of *Aspergillus flavus* and *Aspergillus parasiticus*.** *Journal of Food Protection* 54(5): 1991: 375-377

The fungitoxic effect of BHA on germination of conidia from 7 toxigenic strains of *Aspergillus* was examined on potato dextrose agar (PDA). At concn. of 200 µg/ml and above, BHA prevented germination of conidia in all of the test fungi after 24 and 48 h of incubation. On the other hand, at 100 µg/ml BHA reduced the rate of germination. When an impregnated disk assay was employed, distinct inhibition zones were observed at 200, 400, 800 and 1000 µg/disk of BHA after 24 h of incubation. After 48 h of incubation, distinct inhibition zones were still observed at 800 and 1000 µg/disk. AS

Mushrooms

2182

Khanna (PK), Bhondari (R), Soni (GL) and Garecha (HS). **Evaluation of *Pleurotus* spp. for growth, nurtitive value and antifungal activity.** *Indian Journal of Microbiology* 32(2): 1992: 197-200

Six *Pleurotus* sp. (*P. florida*, *P. fossulatus*, *P. flabellatus*, *P. pulmonarius*, *P. eryngii* and *P. columbinus*) were cultivated on wet wheat straw during winter. The biological efficiency (fresh wt. of fruits divided by dry wt. of straw and multiplied by 100) of these sp. ranged from 12.5 to 72.4%, with max. in case of *P. florida* and min. in *P. eryngii*. All the sp. were rich in protein (26.97 - 31.96%), carbohydrates (44.76 - 53.30%) and minerals (8.7 - 10.9%). The fat content of all the sp. was low (5.4 to 8.0%). *In vitro* digestibility of the *Pleurotus* fermented straw (spent straw) was 4 - 12% more than unfermented except in case of *P. fossulatus* and *P. eryngii* fermented straw, where the corresponding values were lower. The culture filtrates of *Pleurotus* sp. showed antifungal activity against seven common competitor molds of white button mushroom. GS

Yeasts

Kluyveromyces lactis

2183

Pivarnik (LF) and Rand (AG). **Assay conditions effect on β-galactosidase activity from *Kluyveromyces lactis*.** *Journal of Food Science* 57(4): 1992: 1020-1021

β-Galactosidase, derived from *K. lactis* was assayed for activity using lactose, buffered at pH 6.5 with 0.02M potassium phosphate, and reconstituted non-fat dry milk (NFDM) substrates. Variations in buffer strength, potassium ion concn. and water quality were evaluated. Assay under similar conditions using NFDM and buffered lactose resulted in 4.3 and 6.6 units of activity, respectively. Increasing buffer strength to 0.1M potassium phosphate resulted in a 20% decrease in lactase activity units. Addition of potassium ions, as 0.5M KCl, in the enzyme preparation resulted in an increase in observed activity using both assay systems with a greater impact (160% increase) using NFDM vs buffered lactose (120% increase) as the substrate. AS

Hygiene

2184

Overdahl (BJ) and Zottola (EA). **Evaluation of selected sanitizers to control bacteria in a simulated sweet water coolant system.** *Journal of Food Protection* 54(4): 1991: 305-307

Three types of sanitizers commonly used in dairy processing plants were evaluated at varying concn. and at 25 and 4 C for their ability to control potential spoilage and pathogenic bacteria in water. Test organisms included *Pseudomonas fluorescens*, *Staphylococcus haemolyticus*, and *Bacillus* spp. These had been isolated from samples of sweet water coolants collected in a previous national survey in grade A dairy plants. *S. haemolyticus* required 10 p.p.m. chlorine, 12.5 p.p.m. iodine, or 10 p.p.m. quaternary ammonium compound (QAC) to reduce the population > 99% at 25 C. At 4 C, however, only 93% of the population of *S. haemolyticus* was reduced with the 10 p.p.m. QAC. Concn. of 25 p.p.m. chlorine, 2.5 p.p.m. iodine, or 20 p.p.m. QAC reduced the *P. fluorescens* population > 99% at both 25 and 4 C. The *Bacillus* spp. was reduced > 99% at concn. of 10 p.p.m. chlorine at 25 and 4 C, 2.5 p.p.m. iodine at 25 C, and 10 p.p.m. QAC at both temp. At 4 C, 2.5 p.p.m. iodine reduced the Bacillus population to only 93%. All 3 organisms were reduced > 90% at both test temp. with concn. of 25 p.p.m. chlorine, 12.5 p.p.m. iodine, or 20 p.p.m. QAC. AS

BIOTECHNOLOGY

2185

Kaimal (TNB). **Biotechnology: Why, how... and so what ?.** *Journal of the Oil Technologists Association of India* 23(4): 1991: 66-75

Alternate sources of oil from yeasts, microbes, fungi and microalgae are reviewed. Major lipids identified are oleic, palmitic and linoleic acids from fungi: triacylglycerols from oleaginous yeasts: and β-carotene from algae. Enzyme catalyzed modification of oils: asymmetric synthesis and kinetic resolution of racemates: chemical modification of porcine pancreatic lipase: microbial production of dicarboxylic acid and chiral epoxides: and production of acrylamide from acrylonitrile using bacteria are considered. GS

TISSUE CULTURE

Nil

FOOD ADDITIVES

Colourants

2186

Roy (AK) and Chakrabarti (J). **Added colours in foodstuffs from Calcutta markets.** *Science and Culture* 57(1/2): 1991: 40-41

More than 1000 samples of sweetmeats, flattened rice, cereal and pulse products, confectionery, fish, vegetables, cut-fruits, milk and milk products, velpuri, turmeric powder and egg (shell) were analysed by existing methods of Pearson, AOAC, Guha and the Association of Public Analysts England and Woll dying technique with some modifications and the colouring matters were established. The method of analysis is imprved to remove interfering substances like fatty substances, sugar and caseinous matter: to transfer of colour from aqueous to non-aqueous phase: suspecting basic and oil soluble colours from their solubility in extractant before acidification. SD

Preservatives

2187

Kalra (MS), Matta (H) and Ajit Singh. **Nisin as an aid in extending shelf-life of various foods.** *Indian Food Packer* 46(2): 1992: 5-15

The use of nisin as a preservative in various foodstuffs - hard processed cheeses, pasteurized and sterilized milks and milk products, canned foods, meat, alcoholic beverages and fruits is reviewed. The properties of nisin and its mode of action are described. The controversy regarding the toxic effect of nisin is also discussed. 73 references. GS

CEREALS

Barleys

2188

Zawistowski (J), Ansell (M), Zawistowska (U) and Howes (NK). **A monoclonal antibody to endogenous α-amylase inhibitor of barley.** *Journal of Cereal Science* 15(1): 1992: 1-4

Reports the production of a highly specific monoclonal antibody (4F10-5, IgG_1) to barley endogenous α-amylase inhibitor, which could be used to develop a quantitative assay to screen for the presence of the inhibitor in barley varieties. BV

2189

Guerin (JR), Lance (RCM) and Wallace (W). **Release and activation of barley β-amylase by malt endopeptidases.** *Journal of Cereal Science* 15(1): 1992: 5-14

Cysteine-endopeptidases, purified from malt and 2-mercaptoethanol (2-ME), mediated the release and activation of bound β-amylase prepared from quiescent barley seeds (*Hordeum vulgare* L. cv. Clipper). Treatment with 2-ME (1 mM) resulted in an increase in the activity of the enzyme in the soluble fraction, but there was no change in the number of isoforms identified by isoelectric focusing and activity staining using a starch overlay procedure. Treatment with two cysteine-endopeptidases prepared from germinating barley (in the presence of 1 mM 2-ME) resulted in a similar increase in activity and the generation of a range of isoforms with increased pI values. These were similar to those found in germinated barley. Two isoforms found in germinated barley were not present in the endopeptidase-treated samples, however. The activity of free β-amylase, extracted from quiescent barley seed, was also increased by treatment with 2-ME and the endopeptidases. AS

2190

Best (S) and Muller (R). **Use of the hagberg falling number apparatus to determine malt and barley**

quality. *Journal of the Institute of Brewing* 97(4): 1991: 273-278

The Hagberg Falling Number measurement, widely used in the milling industry for assessing the baking quality of wheat flour, has been modified and used as a rapid mashing technique to assess malt quality. Barley Malt flour is mixed with cold mashing liquor containing 0.1% $CaCl_2$ and 15 mM β-mercapto-ethanol. The slurry is heated and mixed by the Falling Number apparatus, and the starch is gelatinized. After one min of heating/mixing the stirring rods are raised and released. As the gelatinized starch is hydrolysed by amylases, the viscostiy of the slurry decreases allowing the stirring rods to fall. The time taken for these rods to fall a fixed distance is called the Falling Number. A relationship has been determined between the Falling Number obtained for a malt and the quality of the malt. Poor quality malts had a high Falling Number (e.g. > 200s) whilst good malts had a low Falling Number (e.g. < 150s). The correlation coeff. between Falling Number and Hot Water Extract (IOB coarse grind) was -0.89, and between Falling Number and Friability was -0.96. These good correaltions indicate the measurement was influenced by the degree of endosperm modification. Being a mashing technique, however, the Falling Number was also influenced by other factors which influence mashing such as enzyme complement and water binding. This technique has the potential to measure malt quality using a commercial apparatus more rapidly than present malt analyses. No significant relationship could be determined between the Falling Number and the malting quality of barley. AS

2191

Holmes (MG). **The use of partially-modified barley for malting quality assessment.** *Journal of the Institute of Brewing* 97(4): 1991: 283-289

A series of tests based on the changes in the characteristics of barley caused by partial malting were investigated for selection of progeny with high malting potential from a breeding programme. The characteristics of these partially-modified barleys were investigated using Near Infra Red Reflectance Spectrophotometry (NIR), Pearling Resistance (PR), changes in Viscosity of Acidic Extracts, and changes in wt. and translucency of the cut surface of boiled grains. NIR carried out on "dry malts" was found to be accurate, whereas other methods were insufficiently accurate for selection. AS

Oats

2192

Duve (KJ) and White (PJ). **Extraction and identification of antioxidants in oats.** *Journal of the American Oil Chemist's Society* 68(6): 1991: 365-370

Eight separate solvent systems were used with groats and hulls of several lines of oats to determine which system resulted in the most effective, rapid extraction of antioxidants. Antioxidant activity at room temp. was estimated by using thin-layer chromatography (TLC) along with a β-carotene spray. The greatest antioxidant activities were obtained with methanolic antioxidant extracts derived from Noble and Ogle oats and hulls. These extracts were added to soybean oil (SBO) and their effectiveness was compared with that of BHT, TBHQ and a control (no additives) at 32, 60 and 180 C. A petroleum ether extract of Noble oats also was tested in SBO at 180 C. Peroxide values (PV) for oils with added antioxidants during storage at 32 C and 60 C showed that the Ogle oat extract was more effective than the other oat and hull extracts or the control. There were no significant differences in effectiveness among the extracts and the control at 60 C. At 180 C, the stability of each oil was determined by measuring conjugated dienoic acid values (CD) and the relative amounts of the unoxidized fatty acid methyl esters (FAME) 18:2, 18:3 and 18:2/16:0. All oils with added oat and hull extracts had significantly lower CD and significantly higher 18:2/16:0 than oils with added BHT, TBHQ or the control during 14 days at frying temp. Phenolic and hydroxy-phenolic antioxidants compounds with acids, alcohols, sugars or glycerides attached were tentatively identified in the oat and hull extracts by using TLC and chromatographic sprays. AS

2193

Larsson (M) and Sandberg (A-S): **Phytate reduction in oats during malting.** *Journal of Food Science* 57(4): 1992: 994-997

The possibility of activating oat phytase by malting and a comparison of the optimal temp. and pH for phytase activity in oat, wheat, rye and barley was made. Addition of sprouted rye and barley as a potential source of phytase in oats was also investigated. Phytate reduction in oats, wheat, rye and barley during malting at 15 C for 30 - 40 h was 16, 2, 2 and 50% respectively. Optimum incubation temp. for phytate reduction in oats was between 37 - 40 C which differed from that in wheat (55 C). Malting of oats for 5 days at 11 C and subsequent incubation for 17 h at 37 - 40 C reduced phytate by 98%. Addition of sprouted rye or barley to oats before soaking reduced phytate to low levels. To obtain flour with a high mineral content, cereals could be soaked at optimal conditions and then malted. GS

Rice

2194

Lee (JH) and Singh (RP). **Influence of parboiling and freezing conditions on textural properties of California cooked rice.** *Journal of Food Quality* 14(5): 1991: 407-423

Thawed samples of cooked parboiled long (Cal Belle) and short (S 201) grain rice evaluated by Instron (Model 1122) showed significant increase of hardness but decrease in stickiness. The long grain rice was harder and less sticky than short grain rice. Hardness was negatively correlated with stickiness (r = -0.82). SD

Rice bran

2195

Ramsay (ME), Hsu (JT), Novak (RA) and Reightler (WJ). **Processing rice bran by supercritical fluid extraction.** *Food Technology* 45(11): 1991: 98, 100, 102, 104

This article compares the extraction of rice bran oil and the sterol composition of the extracted oil using conventional hexane and supercritical carbon dioxide with and without cosolvents. The results show that supercritical fluid process provides high quality and more natural rice bran products along with the high-valued sterol end products and it is more feasible for commercial applications. CSA

Rice starch

2196

Chrastil (J). **Influence of storage on supercooling of rice starch and flour gels.** *Journal of Agricultural and Food Chemistry* 39(10): 1991: 1729-1731

Supercooling (SC) of amylose-amylopectin mixtures and starch or flour gels from fresh and stored rice has been studied. The results showed that the extent of SC of the amylose-amylopectin gels was indirectly related to the amylose content. Amylose sol. or gels did not supercool and, in the mixtures with amylopectin, inhibited SC. The SC of starch gels was influenced by oryzenin (rice storage protein). The supercooling of starch or flour gels from different var. of postharvest and stored rice was related to the mol. wt. of oryzenin and starch, oryzenin-starch interactions, and water binding, which reflected the structural changes or oryzenin and starch during rice storage. AS

Wheat

2197

Hamer (RJ), Weegels (PL) and Marseille (JP). **Prediction of the breadmaking quality of wheat: The use of HMW glutenin- a subunit-based quality scoring systems.** *Journal of Cereal Science* 15(1): 1992: 91-102

In this paper the possibilities of predicting the breadmaking quality of wheat are evaluated. This evaluation is based on the statistical analysis of two collections of Dutch-grown wheat samples. One collection, consisting of 164 wheat samples grown in 1984 is used to develop so-called prediction models. This includes models based only on HMW glutenin-A subunit compositions and an expanded model also including other parameters correlating with breadmaking quality. A second collection, consisting of 84 wheat samples grown in 1985, is used to validate the '1984' models. The HMW glutenin-A subunit-based models correlate positively but poorly (r^2: 0.30-0.36) with loaf vol. Extending the model with other quality related parameters (particularly SDS-sedimentation vol.) leads to an improved model (r^2 = 0.73). The validation using the second sample set shows however that the predictive value of the HMW glutenin-A subunit based model is negligible (r^2 = 0.005) whereas the extended model also fails to allow a reliable prediction (r^2 = 0.32). Clearly, breadmaking quality is governed by the quality of the HMW glutenin-A subunits, and other factors, one of which is correlated with the amount of glutenin proteins. This leads to the general conclusion that electrophoretic scoring systems can only be of very limited use for the prediction of breadmaking quality. AS

Wheat starch

2198

Gibson (TS), Al Qalla (H) and McCleary (BV). **An improved enzymic method for the measurement of starch damage in wheat flour.** *Journal of Cereal Science* 15(1): 1992: 15-27

An improved enzymic method for the detn. of starch damage in wheat flour has been developed and characterized. The proposed method is simple and reliable, and enables up to 20 samples to be measured in duplicate in 2 h. A single assay takes approx. 40 min. The assay protocol is in two phases. In the first, the flour sample is incubated with purified fungal α-amylase to liberate damaged starch granules as soluble oligosaccharides. After centrifugation, the oligosaccharides in the supernatant are hydrolysed by amyloglucosidase to glucose in phase 2. The glucose is then quantified with a glucose oxidase/peroxidase reagent. The proposed method therefore avoids potential errors

associated with existing standard assays, which employ unpurified amylase preparations and non-specific reducing group methods to quantify the hydrolytic products. Despite the use of purified assay components, the proposed starch damage method did not exhibit an absolute end-point to the action of α-amylase in phase 1. This was due to a low rate of hydrolysis of undamaged granules, and is a feature of enzymic methods for starch damage detn. Other amylolytic enzymes, including β-amylase, isoamylase and pullulanase, and combinations of these enzymes, were evaluated as alternatives to α-amylase in the proposed method. These enzymes, when used alone gave no benefits over the use of α-amylase. When used in combination with α-amylase, there was a synergistic action on undamaged granules. A test kit based on the assay format described in this paper is the subject of an international interlaboratory evaluation. AS

MILLETS

2199

Almeida (NG), Calderon de la Barca (AM) and Valencia (ME). **Effect of different heat treatments on the antinutritional activity of *Phaseolus vulgaris* (variety Ojo de Cabra) lectin.** *Journal of Agricultural and Food Chemistry* 39(9): 1991: 1627-1630

Ojo de Cabra bean lectin was partially characterized, and the nutritive value of raw and heat-processed beans were investigated in relation to this compound. The lectin purified by affinity chromatography on immobilized fetuin presented two bands of about 30 kDa in SDS-PAGE. It had an unusual high hemagglutinating capacity, and it was inhibited by fetuin and galactose. The lectin activity decreased 84% by dry heating and 99.8% by cooking. Although biological values of cooked beans were similar to those of other beans, toasting affected the PER and wt. of rats, but not the NPR. Raw beans were highly toxic; 33% of animals died at 10 days. The NPR value was negative, and this group lost more wt. than the N-free diet group. The histological examination revealed that the dietary lectin was bound to the mucosal surface coat of the duodenum and jejunum. AS

Corn

2200

Falabella (MC), Suarez (C) and Viollaz (PE). **Drying kinetics of corn in contact with a solid adsorbent.** *Journal of Food Engineering* 13(4): 1991: 273-283

This paper reports corn drying exp. using commercially available sodium bentonite clay. The sorption isotherm for the type of clay used in this work is also reported. Drying tests conducted with corn-to-clay mass ratios of 1:10 and 1:5 showed no effect on the drying rate. Similar results were obtained from drying exper. conducted with and without mechanical agitation of the mixtures. The effect of the clay temp. (18, 40 and 50 C) on corn drying was also investigated. Drying curves of corn subjected to air flows at 40 and 50 C were compared with those obtained with bentonite at the same temp. The drying kinetics in both cases were practically similar. AS

2201

Montville (TJ) and Shih (P-L). **Inhibition of mycotoxigenic fungi in corn by ammonium and sodium bicarbonate.** *Journal of Food Protection* 54(4): 1991: 295-297

This study sought to determine if NH_4HCO_3 and $NaHCO_3$ inhibit the naturally-occuring fungi in corn. Addition of 1 and 2% NH_4HCO_3 into cracked corn caused 5.9 - and 5.1-log CFU/g reductions, respectively, of corn's natural mycoflora. The same level of $NaHCO_3$ produced 1.2- and 2.0-log CFU/g reductions. In addition, NH_4HCO_3 fully inhibited monocultures of *Aspergillus ochraceus*, *Fusarium graminearium*, and *Penicillium griseofulvum* inoculated into autoclaved corn. $NaHCO_3$ was not as inhibitory but reduced the production of ochratoxin A 100-fold. AS

2202

Huang (CJ) and Zayas (JF). **Aroma quality of corn germ protein flours determined by sensory and gas chromatographic profiles.** *Journal of Food Quality* 14(5): 1991: 377-390 .

Acid washed, heat-treated and alcohol-washed corn germ protein flour (CGPF) were evaluated for aroma profiles by descriptive analysis procedure. Canonical discriminant analysis showed 4 clusters based on 8 descriptive attributes. Stepwise multiple regression between sensory and instrumental data (19 GC peaks eliciting important olfactory response) is established to predict aroma quality of CGPF. SD

2203

Bauer (A), Steger (U) and Wallnofer (PR). **Content of thiamin in green corn processed in the kitchen.** *Deutsche Lebensmittel-Rundschau* 87(6): 1991: 180-182 (De)

No significant change in fresh or cooked green corn soup and stored green corn soup was observed, but thiamin loss was observed in green corn soup kept warm for a longer time. BV

Sorghum

Sorghum starch

2204

Carcea (M), Cubadda (R) and Acquistucci (R). **Physicochemical and rheological characterization of sorghum starch.** *Journal of Food Science* 57(4): 1992: 1024-1025, 1028

The nature and functional behaviour of purified starches from 3 cvs of white sorghum [(i) Drawf White Milo, (ii) Dabar and (iii) Sorghum 100] were compared with commercial wheat starch. Wheat starch showed higher total lipid content (1.66%) than the 3 sorghum starches in which the lipids ranges from 0.75% for Dabar to 1.45% for Milo. The amylose content of sorghum starches was in the range of 22.0 - 27.8%. The water binding capacity of sorghum Dabar did not differ from that of wheat (110%). At 65 and 70 C (iii) starch showed higher swelling power values than (i) and (ii). Sorghum starches exhibited higher gelatinization temp. (about 65 C) than wheat starch (about 50 C). Sorghum starches showed single-step viscoamylographic curves with pronounced pasting peaks, good pasting stability and good set-back on cooling. GS

PULSES

2205

McCurdy (SM). **Infrared processing of dry peas, canola, and canola screenings.** *Journal of Food Science* 57(4): 1992: 941-944

The effect of infrared processing on the bitter flavour and protein solubility of dry peas (cv. Victoria); dehulling characteristics, myrosinase inactivation and oil quality of canola (cv. Wester) seed and seed viability and myrosinase activity of canola fine screenings was studied. Dehulling and air classification characteristics of processed dry peas was similar to raw peas. The protein content of concentrates from pea infrared heated to 107 C and 117 C was higher than that from raw peas or those heated to 126 C. Infrared heating to 107 C decreased protein solubility of raw peas. Peas processed at 126 C were more strongly flavoured than those processed at lower temp. The protein content of the dehulled canola (raw or processed) were between 21 and 22% (DM basis). The moisture contents of the raw and infrared processed canola were low. Heat processing seed partially inactivated myrosinase, but even the highest processing temp. could not inactivate the enzyme totally. Infrared processing resulted in oils with higher P contents than in the oil from the raw seed. Heating to 105 C inactivated a high proportion of the myrosinase in canola fine screenings because of their higher moisture content (9.9 vs 5.3%) than the seed. GS

Peas

2206

Chan (ASM), Pereira (RR), Henderson (HM) and Blank (G). **A non-dairy frozen dessert utilizing pea protein isolate and hydrogenated canola oil.** *Food Technology* 46(1): 1992: 88-92

The formulation and preparation of an all-vegetable frozen dessert utilizing pea protein isolate and hydrogenated canola oil with acceptable sensory qualities to meet the special dietary needs is described. CSA

2207

Das (N), Saini (SPS) and Bains (GS). **Drying behaviour of green peas.** *Indian Food Packer* 46(2): 1992: 27-33

Green pea (*Pisum sativum*) var. (Pb-87, Pb-88 and Hb-8) were harvested after 110 days (Pb-87 and Pb-88), 90 days (Hb-8) (maturity I) and 15 days thereafter (maturity II) and the drying characteristics were studied. Peas from first picking dried faster and gave higher drying ratios. Hb-8 showed lower drying ratio than Pb-87 and Pb-88 when harvested at maturity I. All the cv. behaved alike in their dehydration characteristics. Tender peas were most suitable for dehydration. Moisture, soluble sugars and ascorbic acid of pea declined with maturity. AIS, fibre, starch, protein, chlorophyll and phytic P increased with maturity. KAR

Snap beans

2208

Trail (MA), Wahem (IA) and Bizri (JN). **Snap bean quality changed minimally when stored in low density polyolefin film package.** *Journal of Food Science* 57(4): 1992: 977-979

Snap beans packed in low density polyolefin film and stored at 5 C and 10 C were removed at days 0, 4, 8, 12, and 16 for quality evaluation. Chlorophyll content of beans stored at 5 C was not influenced by storage period. Pods stored at 10 C showed significant increase in chlorophyll after 4 days storage followed by a decline as time of storage increased. Hue angle and tristimulus a corresponded more closely to chlorophyll content and were better indicators of snap bean colour than

chroma and tristimulus L^* and b^*. Wt. loss, seed percentage and ascorbic acid were higher in pods stored at 10 C than in those stored at 5 C. Storage temp. and period had no influence on texture or soluble solids content. AS

OILSEEDS AND NUTS

Groundnuts

2209

Chiou (RY-Y), Tseng (C-Y) and Ho (S). **Characteristics of peanut kernels roasted under various atmospheric environments.** *Journal of Agricultural and Food Chemistry* 39(10): 1991: 1852-1856

Peanut kernels (Tainan 9, a Spanish cv) were roasted in a stainless steel vessel (600 mL) at 210 C under a continuous flow of air, N_2, CO_2 and O_2 at 1.3L/min (LPM) and without aeration as a control, for 0, 10, 18, and 25 min. Hunter L values of the deskinned kernels decreased while a and b values increased with roasting time. The most and the least significant changes in colour of peanuts occurred under O_2 and CO_2 atm., respectively. The best flavour was obtained by roasting peanuts under N_2 or CO_2 for 18 min. Decreases of total α-amino N, glucose, sucrose and conarachin contents and specific lipoxygenase activity were dependent on the extent of heat treatment (roasting time) rather than on atm. gas composition. Peanuts roasted under O_2 for 25 min were more stable during initial stages of an oven test at 62 C compared to peanuts roasted under other types of atmospheric gas. AS

2210

Chiou (RY-Y), Ferng (S) and Liu (Y-F). **Comparison of sound and shriveled peanut kernels from sized commercial lots.** *Journal of Food Science* 57(4): 1992: 998-1001

Sound and shriveled peanut kernels obtained from sized commercial lots were subjected to compositional analyses, and roasted at 150 C for 25 min before subjecting to analysis of sugars, total and free amino acids, protein patterns and oven test. Shriveled raw peanuts contained higher moisture, free amino acid, sucrose, and glucose, and lower lipid contents than sound peanuts. Shriveled kernels underwent greater decreases in total and free amino acids, less increase in sucrose, and more protein denaturation after roasting. Shriveled kernels were more susceptible to oxidative deterioration. AS

2211

Manoharan (V) and Ramalingam (RS). **Oil content and its association with seed size and yield in Virginia groundnuts.** *Madras Agricultural Journal* 77(9-12): 1990: 562-564

Fifty Virginia Bunch and Virginia Runner groundnut (*Arachis hypogeae* L. subsp. *hypogeae*) were selected at random and the kernel yield and kernel wt. were recorded. Oil content was estimated by NMR spectrometer. Oil content showed a very low genotypic coeff. of variation (2.49%). Broad sense heritability was high for seed size and oil content. Oil content was positively correlated with seed size and seed yield. Hence simultaneous improvement in oil content could be achieved through indirect selection for seed size and yield. GS

Soybeans

Soy products

2212

Shambuyi (M), Beuchat (LR), Hung (Y-C) and Nakayama (T). **Evaluation of substrates and storage conditions for preparing and maintaining starter cultures for *tempeh* fermentation.** *International Journal of Food Microbiology* 15(1/2): 1992: 77-85

Heat-pasteurized cassava root, cowpeas, partially defatted peanuts, rice and soybeans were evaluated for their suitability to support growth and sporulation of the *tempeh* mold. *Rhizopus microsporus* var. *oligosporus*, and the *oncom* mold, *Neurospora intermedia*, at 25, 30 and 37 C. The molds grew best and sporulated most luxuriantly on cassava and rice incubated at 37 C. Viability of molds remained high for up to 30 wks when dried (a_w 0.48), powdered substrates on which the molds had been cultured, were stored at 5, 25 and 37 C. Survival was best when powders were stored at 5 C, although storage at 25 C did not cause a marked decline in CFU/g. *R. microsporus* var. *oligosporus* starter cultures produced on rice and then stored for 20 wks at these temp. compared most favourably with commercial starter cultures for preparing high-quality soybean *tempeh*. The simple technology required to prepare these starter cultures enhances the potential for their application in developing countries where the introduction of nontraditional fermented legume foods to low-protein diets could help to ameliorate malnutrition. AS

2213

Gennandios (A) and Weller (CL). **Edible films and coatings from soy milk and soy protein.** *Cereal Foods World* 36(12): 1991: 1004-1009

Protein-based edible films have many applications in food products. The manufacture, characteristics, and application of such films from soybeans are discussed in this review article. 57 references. BV

Tofu

2214

Roussel (AM), Ravel (A), Faure (P), Alary (J) and Favier (A). **Tofu consumption: Effects on plasma lipids in rats.** *Journal of Food Science* 57(4): 1992: 903-905, 912

Rats (Wistar) fed on the tofu (soybean curd) diet showed very low cholesterol levels and an acceptable high density lipoprotein (HDL) cholesterol/total cholesterol ratio. Growth and amino acid profile were also adequate, but the bioavailability of trace elements decreased. BV

Soy proteins

2215

Yu (M-A) and Srinivasan Damodaran. **Kinetics of destabilization of soy protein foams.** *Journal of Agricultural and Food Chemistry* 39(9): 1991: 1563-1567

The kinetics of destabilization of soy protein foams was studied by monitoring the decay of interfacial area of foams as a function of time. The decay of soy protein isolate (SPI), soy 11S, and soy 7S foams followed biphasic first-order kinetics. These two kinetic phases were related to gravitational liquid drainage and interbubble gas diffusion processes. The relative magnitude of the contribution of these two microscopic processes to foam decay was dependent on environmental factors such as pH, temp., ionic strength, and protein concn. SPI and soy 11S foams were more stable than soy 7S foams. The poor stability of soy 7S foam was mainly due to its inability to retard gravitational drainage. AS

2216

Klavons (JA), Bennett (RD) and Vannier (SH). **Stable clouding agent from isolated soy protein.** *Journal of Food Science* 57(4): 1992: 945-947

A process to prevent particle aggregation and provide a model system analogues to cloud particle formation and retention in fresh and commercially processed citrus juices is presented. Results indicated that the use of isolated soy protein (PP 710) instead of a crude soy protein eliminated undesirable off-flavour. The stability of the beverage is affected adversely, when soy protein is increased in the medium by a factor of 10, maintaining the soluble pectin concn. The use of soy protein based clouding agent in beverages has many advantages. It eliminates the need of brominated vegetable oils and other lipid-based materials. GS

TUBERS AND VEGETABLES

Beet roots

2217

Drdak (M), Altamirano (RC), Rajniakova (A), Simko (P), Karovicova (J), Benkovska (D). **Red beet pigment composition. Effects of fermentation by different strains of *Saccharomyces cerevisiae*.** *Journal of Food Science* 57(4): 1992: 935-936

Pasteurized red beet juice was inoculated with seven strains of *Saccharomyces cerevisiae* after adjusting pH to 5.8. Fermentation was at 26 C. The decay of red beet pigments was spectrophotometrically determined and expressed as betanine. Average percentages of betanine, isobetanine, betanidine, isobetanidine and the saccharide components were monitored by HPLC. After 40 h fermentation, the strains Oenoferm, 1090 and Tokaj 76D showed pigment retentions and sucrose concn. ($g.L^{-1}$) of 62% and traces, 58% and 3.4, and 56% and 1.4 respectively, and were considered the most suitable. AS

Carrots

2218

Oliveira (FAR) and Silva (CLM). **Freezing influences diffusion of reducing sugars in carrot cortex.** *Journal of Food Science* 57(4): 1992: 932-934

The loss of reducing sugars from raw and previously frozen carrot cortex tissue immersed in warm water was studied as a function of temp. (40 - 100 C). Leaching was described as a diffusional mechanism by application of Fick's 2nd law. This approach successfully modeled losses from raw carrots at temp. higher than 60 C. At low temp. diffusion was much slower, due to a high resistance of the tissues to mass transfer, and Fick's 2nd law could not be applied. Previously frozen carrots showed a Fickian behaviour through the range of temp. and diffusivities were much higher. Dependence of diffusivity on temp. followed an Arrhenius type equation for the 2 cases. However, the activation energy of pre-frozen carrots was lower, indicating loss of sensitivity to temp. variations. AS

Turnips

2219

Moreira (LA), Oliveira (FAR) and Silva (TR). **Prediction of pH change in processed acidified turnips.** *Journal of Food Science* 57(4): 1992: 928-931

The acetic acid uptake by turnips was studied during an acidification process in containers. The process was successfully described by a Fickian diffusion, using a correlation for the buffer effect. Diffusion coeff. (0.629 to 3.99 x 10^{-9} m^2/sec) and partition coeff. (0.8 to 1.1) were obtained by optimization of the fit between experimental and theoretical values, using the simplex method. The partition coeff. did not show an evident dependence on temp., while diffusivity followed an Arrhenius type behaviour. The relationship between acid concn. and pH was described using a cubic model with parameters independent of temp. Results showed that the combination of these models describing the acid diffusion into the food and the buffering effects of the food allowed accurate prediction of pH evolution in the acidification process. AS

Potatoes

2220

Shivankar (VJ) and Kavadia (VS). **Effect of post-harvest processes in heptachlor residues in potato, sweet potato and onion.** *Tropical Agriculture* 69(1): 1992: 25-28

Heptachlor and heptachlor residues as influenced by the washing, boiling/cooking and dehydration were determined in the mature tubers/bulbs of sweet potato, potato and onion grown on clay-loam soil treated with 2.5, 5.0 and 10.0 kg a.i.ha^{-1} 35 days before harvest were used. Washing removed 22-29% insecticide from all crops. Washing plus peeling and cooking removed 85 - 93% and 94-100% of heptachlor residues in sweet potato and potato respectively. Dehydration reduced the residues by 74 - 100%, 80-100% and 84-100% in sweet potato, potato and onion respectively. Max. 0.03 p.p.m. of heptachlor was detected in sweet potato, and potato after cooking whereas in onion there was no residue. SD

Vegetables

2221

Van Buren (JP) and Pitifer (LA). **Retarding vegetable softening by cold alkaline pectin deesterification before cooking.** *Journal of Food Science* 57(4): 1992: 1022-1023

Snap beans and carrot tissues, deesterified at 1 C and pH 12.5, soften much more slowly than control tissues when cooked at neutral or slightly alkaline pH. High pH or NaCl during cooking had little effect on the degree of softening. Soaking in 0.05 M EDTA led to an 86% loss in firmness. The results were consistent with a reduction in the β-elimination depolymerization of pectin during heating as a result of deesterification in the alkali. Deesterified tissues remained susceptible to pronounced softening during cooking at pH 3.5. Potatoes, cauliflower and apples showed similar effects. Peas gave a reduced response. Beets and dry beans did not show a retardation of softening after an alkali soak. AS

Cabbages

2222

Kallander (KD), Hitchins (AD), Lancette (GA), Schmieg (JA), Garcia (GR), Solomon (HM), Sofos (JN). **Fate of *Listeria monocytogenes* in shredded cabbage stored at 5 and 25 C under a modified atmosphere.** *Journal of Food Protection* 54(4): 1991: 302-304

Shredded cabbage was inoculated with *Listeria monocytogenes* Scott A cells and stored in normal air or a modified (70% CO_2 and 30% N_2) atm. at 5 and 25 C. Under the normal atm. at 25 C, colony counts increased by 2 logs within 2 days of storage but then decreased to undectable levels within 6 days of storage. In the modified atm. at 25 C, numbers also decreased to undetectable levels within 6 days, but with a less marked initial increase and a decline that was more rapid than in the unmodified atm. In the cold (5 C), the counts increased gradually, but only by about 1 log, in both atm. In normal atm. at 5 C, however, colony counts decreased sharply after 13 days of storage. Reductions in colony counts coincided with decreases in cabbage pH and development of spoilage. The increased level of CO_2 was ineffective in controlling *L. monocytogenes* at 5 C. At 25 C cabbage spoilage was rapid and colony counts declined under both atm. of storage. AS

Cauliflower

2223

Barth (MM), Perry (AK), Schmidt (SJ) and Klein (BP). **Misting affects market quality and enzyme activity of broccoli during retail storage.** *Journal of Food Science* 57(4): 1992: 954-957

Vitamin C, enzyme activities, colour and texture changed in misted and nonmisted broccoli (cv. Green Duke) at 0, 24, 48 and 72 h intervals during display cabinet storage (18 C). Misting significantly

improved reduced ascorbic acid ((RAA) P = 0.0001), chlorophyll (P = 0.0001), and green clour retention, as measured by hue angle (P = 0.00021) during 72 h storage. RAA degradation in misted and nonmisted broccoli and total chlorophyll degradation in nonmisted samples followed first order kinetics. Mean % moisture content was significantly greater (P less than or equal to 0.05) in misted broccoli samples at 24, 48 and 72 h storage intervals. No significant difference was found in ascorbic oxidase activity (P = 0.9426) between misted and nonmisted samples. Peroxidase activity was significantly greater in both the nonmisted broccoli floret/stem (P = 0.0221) and stalk tissue (P = 0.0079). BV

Cucumbers

2224

McFeeters (RF). **Cell wall monosaccharide changes during softening of brined cucumber mesocarp tissue.** *Journal of Food Science* 57(4): 1992: 937-940, 953

Cucumber (cv. Calypso) mesocarp tissues were subjected to 3 processing treatments i.e (i) blanched (ii) unheated and (iii) fermented with *Lactobacillus plantarum* and stored at pH 3.5. Results indicated that tissue softening and solubilization of cell wall sugars were similar in the 3 treatments. A limited degradation of pectic and hemicellulosic substances occurred during cucumber tissue softening. Losses in galacturonic acid, galactose, arabinose and rhamnose from cell walls occurred at pH 3.5 when cucumber tissues were subjected to sequential extraction with aqueous sodium dodecyl sulphate and phenol:acetic:water (2:1:1). GS

2225

Omran (H), Buckenhuskes (H), Jackle (E) and Gieschner (K). **Some properties of the pectase, the exo-polygalacturonase and an endo-β-1, 4-glucanase in pickled cucumbers.** *Deutsche Lebensmittel-Rundschau* 87(5): 1991: 151-156 (De)

Tomatoes

2226

Trifiro (A), Gherardi (S) and Castaldo (AD). **Use of rheological parameters for pressure drop calculation of tomato concentrates in tubes.** *Italian Journal of Food Science* 3(1): 1991: 63-68

The use of power law parameters k and n for the calculation of pressure losses in the transport of tomato concentrates (TC) through tube bundles was evaluated. TC at different concn. (10.2 - 15.2 - 23.2 - 27.6°Brix) and different temp. (30 and 80 C) were pumped through tubes of different diam. (2.49 - 3.88 - 4.85 - 6.64 - 8.40 cm) and the corresponding pressure losses were measured. The pressure losses at the different operating conditions were also calculated from the rheological parameters obtained with a concentric cylinder viscometer. For the products at 15.2, 23.2 and 27.6°Brix, good agreement was obtained between the calculated and the experimental data. AS

2227

Bhowmik (SR) and Pan (JC). **Shelf-life of mature green tomatoes stored in controlled atmosphere and high humidity.** *Journal of Food Science* 57(4): 1992: 948-953

Freshly harvested mature green tomatoes were washed, sorted and treated with 125 p.p.m. chlorine water. The treated tomatoes were stored at 85% or 98% RH under controlled atm. (CA) storage for periods up to 8 wk. The CA was 2.5% O_2, 5.0% CO_2, and N_2 as the balance gas at 12 C. After storing for 40 days, the tomatoes were allowed to ripen in air at 23 C. Samples of tomatoes were tested every 3 days to examine changes in quality as determined by visual observation, wt. loss, titratable acidity, pH, colour and firmness. Wt. loss was reduced significantly by CA storage of tomatoes at 98% RH. Tomatoes remained green up to 40 days of storage and changed in colour gradually during consecutive storage in atmospheric conditions. Appearance of the tomatoes was acceptable after ripening. AS

2228

Rodriguez (JH), Cousin (MA) and Nelson (PE). **Oxygen requirements of *Bacillus licheniformis* and *Bacillus subtilis* in tomato juice: Ability to grow in aseptic packages.** *Journal of Food Science* 57(4): 1992: 973-976

Tomato juice was inoculated with spores of *Bacillus subtilis* and *B. licheniformis*, placed in jars sealed with 4 polymers: oriented polypropylene (OPP), low density polypropylene with 4.5% ethyl vinyl acetate (LDPE + EVA), polyvinylidene chloride (PVDC), and polyethylene teraphthalate (PET); used in aseptic packages, serving as lids, heated in a boiling water bath for 10 min, and incubated at 35 C for up to 100 days. *B. subtilis* and *B. licheniformis* grew at the surface of the food when OPP and LDPE + EVA were used, which caused the pH to rise above 4.6 in 60 days and above 5.0 within 100 days. The oxygen partial pressures were 0.20 and 0.18 atm/day, and the oxygen permeation ratios were 5.64 and 0.76 cc/day for LDPE + EVA and OPP, respectively. AS

2229

Chadha (RK), Bryce (F), Lawrence (JF), Conacher (HBS) and Arnold (D). **Toxicity of potassium cyanide added to fresh fruit and juice.** *Food and Chemical Toxicology* 29(10): 1991: 681-684

To investigate the toxicity of potassium cyanide in fresh fruit and juice, male and female Wistar rats were orally dosed with fruit homogenates or juices containing 3 x LD_{50} of potassium cyanide. These were given in single doses at various intervals after spiking. The dosing sol. were analysed for cyanide using a cyanide test kit. There was a good correlation between the toxic signs in rats and the cyanide remaining in dosing sol. The toxicity of spiked apple and honeydew melon diminished with time, while spiked grape and both grape and apple juices maintained their toxicity during the 4-h studies. The pH of the samples both before and after spiking seemed to be an important factor in determining the toxicity. AS

Apples

2230

Matthels (JP), Buchanan (DA) and Fellman (JK). **Change in apple fruit volatiles after storage in atmosphere inducing anaerobic metabolism.** *Journal of Agricultural and Food Chemistry* 39(9): 1991: 1602-1605

Delicious apple fruit (*Malus domestica* Borkh.) stored in 0.05% O_2/0.2% CO_2, 1 C, for 30 days developed large concn. of ethanol and acetaldehyde. The accumulation of products of anaerobic metabolism resulted in altered synthesis of fruit volatiles, most notably a large increase in the amount of ethyl acetate. Several ethyl esters, not detectable from control fruit, were present in headspace samples collected from apples stored in 0.05% O_2/0.2% CO_2 including ethyl propanoate, ethyl butyrate, ethyl 2-methylbutyrate, ethyl hexanoate, ethyl heptanoate, and ethyl octanoate. The increase in the emission of these compounds was accompained by a decrease in the amounts of other esters requiring the same carboxylic acid group for synthesis. AS

2231

Tong (CBS) and Hicks (KB). **Sulfated polysaccharides inhibit browning of apple juice and diced apples.** *Journal of Agricultural and Food Chemistry* 39(10): 1991: 1719-1722

Browning of fresh Granny Smith apple juice was inhibited almost 100% for 24 h at room temp. by the addition of *l*-, *k*-, or λ-carrageenan, alone (0.25%) or in combination (0.05%) with 0.5% citric acid (CA). The combinations of 0.1% of any of the carrageenans and 0.5% sodium hexametaphosphate (SHMP) was slightly less effective. Browning was also inhibited by amylose sulphate (0.025%) or xylan sulphate (0.025%) combined with 0.5% CA. Under the assay conditions, CA alone inhibited browning approx. 34%, but SHMP alone did not inhibit browning. The inhibition of browning by these compounds in combination with the carbohydrate polymers was synergistic. The combination of 0.1% of any of the carrageenans and 0.5% CA was able to inhibit browning of unpasteurized apple juice containing 0.1% sodium benzoate for up to 3 months at 3 C. The combination of 0.5% carrageenan and 0.5% CA also inhibited browning in Granny Smith and Red Delicious diced apple fruit. These combinations may have practical application in the prevention of enzymatic browning in fresh, raw apple juice or diced apples. AS

2232

Amoit (MJ), Tacchini (M), Aubert (S) and Nicolas (J). **Phenolic composition and browning susceptibility of various apple cultivars at maturity.** *Journal of Food Science* 57(4): 1992: 958-962

Phenolic compounds and polyphenol oxidase (PPO) activity in the fruits of 11 apple cvs before and after bruising were studied in relation to their susceptibility to browning. The degree of browning has been determined by the simultaneous measurements of soluble (absorbance at 400 nm) and insoluble (lightness) brown pigments. The sum of these two expressing the extent of browning, closely correlated with the amount of phenolics (hydroxycinnamic derivatives and flavan-3-ols) degraded. Maturity did not appear to greatly influence the development of browning. AS

2233

Yahia (EM). **Production of some odour-active volatiles by 'McIntosh' apples following low-ethylene controlled-atmosphere storage.** *Hortscience* 26(9): 1991: 1183-1185

The effectiveness of some post-storage treatments in enhancing the flavour components of low-ethylene controlled-atm. (LCA) stored 'McIntosh' apples (*Malus domestica* Borkh.) was investigated. Fruits were stored for 9 months in LCA at 3.3 C and then exposed to air at 20 C and to air, simulated LCA, 100% O_2, or light at 3.3 C for up to 4 wks. Respiration and ethylene production indicated that apples were still in the early stage of ripening after

9 months of storage in LCA. GC analysis for 13 odour-active volatiles revealed the presence of 8. Air at 20 C after LCA significantly increased the production of some odour volatiles, while light for up to 3 wks only slightly increased their concn. Post-storage exposure to air or 100% O_2 at 3.3 C for up to 4 wks was not effective in enhancing volatile formation. AS

Dates

2234

Almana (HA) and Mahmoud (RM). **Effect of date syrup on starch gelatinization and quality of layer cakes.** *Cereal Foods World* 36(12): 1991: 1010-1012

Sucrose replaced with date syrup in yellow and chocolate-flavoured layer cakes at 0, 25, 50, 75 and 100% levels showed a deterioration in cake vol., cell structure, grain, texture, colour, and flavour which increased with increasing concn. of date syrup. Chocolate cakes containing 25% date syrup were similar to the sucrose control in all aspects except for being darker in colour. Date syrup delayed gelatinization to a lesser extent than did sucrose. Starch gelatinization temp. was inversely related to the extent of sucrose replacement by date syrup, with flour containing 100% date syrup having the lowest gelatinization temp. BV

Momordica charantia

2235

Yuwai (KE), Rao (KS), Kaluwin (C), Jones (GP) and Rivett (DE). **Chemical composition of *Momordica charantia* L. fruits.** *Journal of Agricultural and Food Chemistry* 39(10): 1991: 1762-1763.

The chemical composition of bitter gourds (BG) was analyzed. The BG yielded on extraction with chloroform-methanol 0.76% lipids (dry wt.), which were separated into nonpolar lipids (38.81%), glycolipids (35.80%), and phospholipids (16.40%) by silicic acid column chromatography. The mineral and amino acid analysis showed that the BG contained nutritionally useful quantities of most of the essential minerals and amino acids. The predominant fatty acid was α-eleostearic acid in nonpolar lipids, linolenic acid in glycolipids, and palmitic acid in phospholipids. AS

Oranges

2236

Charara (ZN), Williams (JW), Schmidt (RH) and Marshall (MR). **Orange flavour absorption into various polymeric packaging materials.** *Journal of Food Science* 57(4): 1992; 963-966, 972

Citrus oil components (from cold-pressed and terpeneless oils), which contribute substantially to flavour of orange juice, were shown to be absorbed into various polymeric materials [LDPE, HDPE, polypropylene (PP), and surlyn (S)] used in aseptic packaging. Equilibration of absorption took place within 4 days, while extraction of the oil constitutents occurred in 24 h when higher temp. were used. Substantial absorption of oil constituents by LDPE and S occurred while highly crystalline polymers (PP and HDPE) did not absorb much. The degree of absorption also depended on the nature of the oil constituents. Absorption was higher for terpene constituents followed by sesquiterpenes and aldehydes. Swelling factors showed that highly crystalline polymers (HDPE and PP) swelled less than crystalline polymeric materials. Citrus oil affected the crystallinity of the polymers by lowering their melting point and percent crystallinity. AS

Pawpaws

2237

Shiota (H). **Volatile components of pawpaw fruit (*Asimina triloba* Dunal.).** *Journal of Agricultural and Food Chemistry* 39(9): 1991: 1631-1635

Volatile components of pawpaw fruit were mainly ethyl esters (hexanoate, 50.2%; octanoate, 19.3%; butanoate, 8.5%; and decanoate, 1.3%) which were accompanied by methyl esters (butanoate, hexanoate, octanoate, geranate, decanoate and farnesate). Butane-2,3-diol monoesters (butanoate, hexanoate and octanoate) were also detected, and these esters except 3-acetoxybutan-2-one were reported to be present in nature for the first time. In addition, the effect of fruit maturity on volatile aroma composition was examined. AS

Pineapples

2238

Takeoka (GR), Buttery (RG), Teranishi (R), Flath (RA) and Guntert (M). **Identification of additional pineapple volatiles.** *Journal of Agricultural and Food Chemistry* 39(10): 1991: 1848-1851

The volatiles of pineapple essence were isolated by liquid-liquid extraction, fractionated on neutral alumina, and analyzed by high-resolution GC and coupled GC/MS. 26 constituents (1 tentative) were identified for the first time in pineapple including the following sulphur compounds: methyl 3-(methylthio)-(E)-2-propenoate, methyl

3-(methylthio)-(Z)-2-propenoate, ethyl
3-(methylthio)-(E)-2-propenoate, ethyl
3-(methylthio)-(Z)-2-propenoate, methyl
4-(methylthio)butanoate, thyl
4-(methylthio)butanoate (tentative), and dimethyl trisulphide. Their odor contribution to pineapple aroma is assessed. AS

CONFECTIONERY, STARCH AND SUGAR

2239

Paul (J). **Different aspects of microbial degradation of cellulose.** *Indian Journal of Microbiology* 32(2): 1992: 127-147

An exhaustive review covering aspects like mode of action of cellulose in different systems including fungal, bacterial, actinomycetes, termites, and in rumen. To improve the enzyme production various improvements done with the existing strains including the study of molecular aspects of degradation, sequence homology and conserved sequences, and modification of specific residues are reviewed. 117 references. KAR

Starch

2240

Timmermann (EO) and Chirife (J). **The physical state of water sorbed at high activities in starch in terms of the GAB sorption equation.** *Journal of Food Engineering* 13(3): 1991: 171-179

A refinement of the Guggenheim-Anderson-de Boer (GAB) sorption model which allows for the existence of a third sorption stage, was used to analyze the behaviour of adsorption isotherms of starches at very high a_w. The results of experimental isotherm analysis with the new model revealed that above about $a_w = 0.90$ a change in the physical state of adsorbed water in starch occurred, i.e. the water molecules would be more 'liquid-like' than in the preceding layers. This transition corresponds with the unfreezable water content in starch, as determined by others. AS

2241

Kim (CS) and Walker (CE). **Changes in starch pasting properties due to sugars and emulsifiers as determined by viscosity measurement.** *Journal of Food Science* 57(4): 1992: 1009-1013

The effects of sugars, emulsifiers, and their interactions on starch pasting properties were determined by the Rapid Visco-Analyser (RVA). Solutions of 50% sugars in water were used. The disaccharides, sucrose and lactose, delayed pasting more than did the monosaccharide, dextrose. Sugars' effects on starch pasting delay and on starch paste consistency varied with the starch. Addition of the same emulsifier (1%) to different starches did not result in the same change in paste consistency in the presence of high amounts of sugar. Both sucrose ester F-160 (SE) and polysorbate 60 (PS) reduced the hot paste consistency of starch-sugar mixtures, with SE having a greater effect than PS. AS

Sugar

2242

Dendsay (JPS), Luthra (R), Sehtiya (HL) and Dhawan (AK). **Deterioration of juice quality during post-harvest storage in some sugarcane cultivars.** *Indian Sugar* 42(2): 1992: 93-95

Post-harvest deterioration in juice quality was studied during the month of April (mean temp. min. 16.7 and max. 33.6 C) at Haryana Agricultural University, Karnal (N. India). Sugarcane cv. (CoJ 64, Co 7717, CoS 767, Co 1158, Co 1148, CoH 56, CoH 77, CoH 35) grown in the field under recommended cultivation practices were detrashed and detoped, bundles were made and stored in the open. Cv. samples were taken at 0, 24, 72 and 120 h, and analysed for Brix, Pol, purity and commercial cane sugar (CCS) %. The test cv., except CoS 767, did not show any drop in sugar recovery at 24 h of post-harvest storage. A sharp decrease in % CCS, Pol, purity and increase in Brix and reducing sugars in most of the cv. at 72 and 120 h after harvest was observed. CoS 767 var. was the most vulnerable as it showed > 50% losses of recoverable sucrose at 120 h of storage, and CoH var. showed the least deterioration. SRA

2243

Malavia (DD), Patel (KP) and Ramani (VB). **Response of irrigation levels and trash mulch on yield and quality of sugarcane.** *Indian Sugar* 44(2): 1992: 97-100

A field exp. was conducted using sugarcane cv. Co 6304 and CoC 671 for 2 yr (1987-88 and 89) on medium black soil at sugarcane Research Station, Gujarat Agricultural Univ. Junagadh to determine the optimum irrigation schedule and the efficiency of trash mulch. Cane yield increased with increasing irrigation frequencies under the IW/CPE ratio of 1:2. The var. Co 6304 out yielded CoC 671 in productivity. Irrigation levels did not show significant effect on quality of canes. Max. net realization of Rs. 9.74/ha was obtained under normal irrigation + trash mulching. SRA

2244

Kundu (S) and Gupta (ML). **Changes in physico-chemical properties of gur on storage in some promising varieties of sugarcane.** *Indian Sugar* 42(2): 1992: 115-118

The gur cubes from 18 var. of sugarcane were prepared, wrapped in colourless polyethylene bags and stored for 9 months from Feb. to Nov. 1990 at room temp. (min. of 20.6 C in Feb. and max. of 40.1 C in June with varied RH of 55 to 94%). Samples were analysed in Feb. and Nov. months for sucrose, reducing sugar, moisture, ash and colour transmittance. Results showed that good keeping quality of gur was found in the var. Co 86024, Co 89003 and Co 89034, in which gur samples had recorded reducing sugar < 6%, ash 2% and both characters were found associated with the higher amounts of sucrose (> 80%) and with low level of moisture content (< 5%) after storage. The max. quantity of gur (10.3%) was produced by the Co 89003 var. followed by Co 89032. The colour transmittance value declined drastically in all gur samples on storage. SRA

BAKERY PRODUCTS

Bread

2245

Oliver (JR) and Allen (HM). **The prediction of bread baking performance using the farinograph and extensograph.** *Journal of Cereal Science* 15(1): 1992: 79-89

Optimal loaf vol. was obtained when dough was mixed to the end of the plateau period of the Farinograph mixing curve. The identification of this point was easier if the Farinograph were run faster (180 rev/min) than the conventional speed (60 rev/min). Unlike mixing time, the work requirement to this point was independent of mixing speed. The Farinograph and Extensograph parameters measured on a flour-water system did not relate well to those made on even a simple bread formula system. To obtain a better prediction of baking behaviour for a commercial application, it is essential that a commercial formula and similar work input be used to mix the dough. AS

Cakes

2246

Sobczynska (D) and Sester (CS). **Replacement of shortening by maltodextrin-emulsifier combinations in chocolate layer cakes.** *Cereal Foods World* 36(12): 1991: 1017-1026

Cakes made with a potato maltodextrin and emulsifiers at 50 or 100% level were comparable to the control 100% shortening cakes. Cakes made with sucrose ester tended to have higher vol. than cakes made with other emulsifiers. Incorporation of prehydrated emulsifier and dry maltodextrin generally provided highest vol. BV

Cookies

2247

Bullock (LM), Handel (AP), Segall (S) and Wasserman (PA). **Replacement of simple sugars in cookie dough.** *Food Technology* 46(1): 1992: 82, 84, 86

This article presents the development of cookies containing no added sugars by replacing them with acesulfame K, a high-intensity non-nutritive sweetener along with polydextrose, powdered cellulose and soy fiber as bulking agents. Properties such as moisture content, break strength, total dietary fiber and reflectance were analyzed and the cookies evaluated had acceptable sensory and physicochemical properties. CSA.

2248

Gaines (CS). **Instrumental measurement of the hardness of cookies and crackers.** *Cereal Foods World* 36(12): 1991: 989, 991-994, 996

The availability of accurate and reproducible product texture measurements can be critical to successful product development. This article describes and discusses two such methods based on adaptation of a standard instrument. BV

MILK AND DAIRY PRODUCTS

2249

Rao (SVN), Kherde (RL) and Tyagi (KC). **Why delay in farmers' adoption of dairy technologies ?.** *Indian Dairyman* 44(6): 1992: 288-301

The personal characteristics of farmers which are positively related to adoption of dairy technologies are surveyed. Dairy farmers with more land and animals, high education status and social participation, more contact with extension and mass media and high knowledge of dairy innovations are found to be better adopters of dairy technologies. GS

2250

Anon. **Measurement and comparison of density, specific heat and viscosity of cow's milk and soymilk.** *Journal of Food Engineering* 13(3): 1991: 221-230

The proximate composition, density, specific heat and viscosity of various dilutions of cow's milk and soymilk produced from each of two local var. of soybeans (TGX 330-0102D and Doko) were determined at 25 C and subjected to regression analyses in order to determine the relationships between the percentage of total solids (%TS) and each of these primary physical properties. Density was found not to be significantly dependent on %TS or var. of soybeans whereas specific heat and viscosity were dependent. The relationship between specific heat and %TS was found to be linear and that between viscosity and %TS was found to be exponential for each of the three milk samples. Generally, at the same %TS, soymilk is denser and has greater specific heat and viscosity values than cow's milk. AS

2251

Fay (L), Richli (U) and Liardon (R). **Evidence for the absence of amino acid isomerization in microwave-heated milk and infant formulas.** *Journal of Agricultural and Food Chemistry* 39(10): 1991: 1857-1859

In this study, UHT milk and three different infant formulas were heated under two sets of conditions: 600 W for 3 min and 70 W for 20 min. When the proportions of D-amino acids were measured after acid hydrolysis, no significant differences could be found between untreated and treated samples. On the basis of these results, it is concluded that heating of milk or infant formula in a microwave oven under conditions corresponding to those normally applied for heating food does not induce significant inversion of protein-bound amino acids. AS

2252

El-Gazzar (FE), Bohner (HF) and Marth (EH). **Growth of *Listeria monocytogenes* at 4, 32 and 40 C in skim milk and in retentate and permeate from ultrafiltered skim milk.** *Journal of Food Protection* 54(5): 1991: 338-342

Pasteurized skim milk and retentate (concentrated fivefold or twofold by vol.) and permeate from ultrafiltered skim milk were inoculated with *Listeria monocytogenes* strains California or V7 and incubated at 4, 32, or 40 C. Changes in populations of the pathogen were determined, growth curves were derived, and generation times and max. populations calculated for each combination of strain, product and temp. Both strains grew faster and achieved higher (ca. 1 to 2 orders of magnitude) populations at 4 C in retentate of either concn. than in skim milk. The pathogen grew in permeate at 4 C and attained max. populations of ca. 10^6 to 10^7/ml. Tyndallized samples of skim milk and retentate and permeate from ultrafiltered skim milk were inoculated with the same strains of *L. monocytogenes* and incubated at 32 or 40 C. Populations achieved by the pathogen at these temp., ca. 10^7 to 10^8/ml, were similar in skim milk, retentate, and permeate. AS

2253

Garcia (T), Martin (R), Rodriguez (E), Azcona (JI), Sanz (B), Hernandez (PE). **Detection of bovine milk in ovine milk by a sandwich enzyme-linked immunosorbent assay (ELISA).** *Journal of Food Protection* 54(5): 1991: 366-369

A sandwich ELISA was developed for the detection of defined amounts of bovine milk (1-30%) in ovine milk. Polyclonal antibodies were raised in rabbits against bovine whey proteins (BWP). Resultant antibodies were affinity purified by immunoadsorption of the crude antiserum onto columns containing immobilized ovine, caprine, and BWP, followed by elution of the bovine milk specific antibodies (anti-BWP) from the column containing the bovine proteins. The specific anti-BWP antibodies bound to the wells of a mocrotiter plate were used to capture the BWP from milk mixtures. Further immunorecognition of the captured proteins was attained with the same specific antibodies conjugated to biotin. ExtrAvidin-peroxidase was used to detect the biotinylated antibodies bound to their specific antigens. Subsequent enzymic conversion of substrate gave clear optical density differences when assaying mixtures containing variable amounts of bovine milk. AS

2254

Bear (RJ). **Alteration of the fatty acid content of milk fat.** *Journal of Food Protection* 54(5): 1991: 383-386

Milk fatty acid composition can be influenced by several factors, many of which are interactive. These include stage of lactation, seasonal variation, low milk fat syndrome, feeding, genetic variation, and changes in the energy status of the cow due to administration of bovine somatotropin. Utilization of feeding, genetic variation, and bovine somatotropin should produce a milk fat lower in saturated and higher in unsaturated fatty acids. This may be beneficial to consumers, as many health

professionals are recommending diets lower in saturated fatty acids. Giving consumers the option of purchasing low saturated fatty acid dairy products may also assist in alleviating the current milk fat surplus in the dairy industry. AS

2255

Sanchez (L), Peiro (JM), Castillo (H), Perez (MD), Ena (JM), Calvo (M). **Kinetic parameters for denaturation of bovine milk lactoferrin.** *Journal of Food Science* 57(4): 1992: 873-879

Kinetic parameters for heat-induced denaturation of lactoferrin under different conditions were determined over a temp. range 72-85 C. Denaturation of lactoferrin could be described by first-order reaction kinetics. Lactoferrin is denatured more rapidly in its apo form than in the Fe-saturated form. Both apolactoferrin and Fe-saturated lactoferrin are more heat-sensitive when treated in milk than in phosphate buffer. Values of change in enthalpy of activation of lactoferrin denaturation are high which indicates that a large number of bonds are broken. The association of lactoferrin with β-lactoglobulin does not significantly influence the change in enthalpy of activation of lactoferrin denaturation. AS

2256

Chang (M-K) and Zhang (H). **Carbonated milk: Proteins.** *Journal of Food Science* 57(4): 1992: 880-882

Carbonated milk showed higher viscosity and longer shelf-life than non-carbonated milk. Carbon dioxide serves as a preservative agent in carbonated milk. However, carbonated milk stored at room temp. spoiled as quickly as pasteurized non-carbonated milk. The size of casein micelle particles reduced upon carbonation. Proteins precipitated when carbonated milk was heated at 60 C for 30 min. When heated at 60 C for only 15 min, the carbonated milk proteins were stable. GS

2257

Lee (SY) and Morr (CV). **Fixation and staining milk fat globules in cream for transmission and scanning electron microscopy.** *Journal of Food Science* 57(4): 1992: 887-891

The evaluation and comparison of 3 OsO_4 fixation methods [imidazole-buffered OsO_4 (IBO), ferricyanide OsO_4 (FO) and tricomplex OsO_4 (TCO)] for studying the microstructure of milk fat globule (MFG) and milk fat globule membranes (MFGM) from dairy cream (CREAM) by transmission electron microscopy (TEM) and scanning electron microscopy (SEM), was carried out. Tannic acid-guanidine-HCL mordant treatment and en bloc staining with p-phenylenediamine was used to increase conductive staining of SEM specimens in order to eliminate the need for metal coating. Results indicated that the 0.5% agarose gel effectively protected the delicate microstructure of MFG from CREAM for examination by SEM and TEM. The 3 methods showed different degrees of presenting MFG and MFGM for visualization by thin-section TEM and SEM. FO and TCO methods preserved the micro-structural details of MFG from CREAM better than the IBO method. GS

2258

Patel (RM), Patel (GK) and Patel (KC). **Physicochemical characteristics of milk fat of surti buffaloes - effect of feed (concentrate mixture and GN cake).** *Journal of the Oil Technologists Association of India* 23(4): 1991: 76-77

Lactating Surti buffaloes were fed with a balanced conc. mixture (containing guar meal 20%, rice bran 30%, maize gluten 28%, red gram husk 20%, mineral mixture 1% and salt 1%) and groundnut cake with or without green grass supplementation. Iodine value (IV), R.M. and Pelshenke values of milk fat were determined before and after 9 months of experimentation. IV of milk fat was higher for groundnut cake fed animals than that fed conc. irrespective of addition of green grass. Feeding of conc. mixture with or without green grass increases the R.M. values; feeding of groundnut cake decreases the R.M. value. Pelshenke value of milk fat increased by feeding conc. mixture of Surti buffaloes. GS

2259

Sharma (AK) and Kuber Ram. **Seasonal variation in consumption pattern of weaker section households with special reference to milk and milk products in Saharanpur district.** *Indian Journal of Dairy Science* 44(8): 1991: 474-478

The study revealed that per capita total expenditure on milk and milk products and expenditure on pure ghee was higher in winter season, whereas expenditure on food items was higher in rainy season. The magnitude of inequality did not vary much in different seasons for per capita total expenditure, expenditure on food items and non-food items. But expenditure on pure ghee and expenditure on milk and milk products showed different degree of inequality in different seasons. The elasticity of food and non-food items did not indicate much variation in different seasons, whereas elasticity of pure ghee as well as milk and milk products was of different order of different seasons. It was also observed that milk and milk products, non-food items and pure ghee was more expenditure elastic than food items. AS

2260

Subrahmanyam (MV), Narasimha Murthy and Bhat (GS). **Distribution of steam volatile monocarbonyls in plasma and lipid phases of milk during different stages of processing.** *Indian Journal of Dairy Science* 44(8): 1991: 496-500

The distribution of steam volatile monocarbonyls (SVMC) in fat and plasma phases during processing of milk to ghee was determined. Higher quantities of SVMC was found in whole milk than in skim milk. About 40% of the total SVMC of whole milk went along with plasma phase while major portions were distributed in fat phase during cream separation. Methyl ketones were found in major portions in both the cases, while SVMC of skim milk contained slightly higher proportions of n-alkanals than that of whole milk. About 66% of SVMC remained with fat phase during churning of cream to butter. Ghee made from butter contained lower quantities of SVMC than butter. Ghee contains only about 53% of SVMC present in butter. AS

Goat milk

2261

Parente (E) and Mazzatura (A). **Growth and heat resistance of *Staphylococcus aureus* in goat milk.** *Italian Journal of Food Science* 3(1): 1991: 27-37

Growth and heat resistance of two strains of *Staph. aureus* in goat milk were studied at different temp. Both strains were unable to multiply at 10 C but reached populations associated with toxin production in 30 h at 20 C and 14 h at 25 C. Values of D = 0.07-0.15 min and z = 4.5-4.8 C were found for heat resistance. *Staph. aureus* could survive subpasteurization treatments and grow during the incubation of milk and cheese at 20 C for several h, the conditions used in manufacturing fresh goat cheeses. AS

2262

Neelam Gupta and Mathur (MP). **Purification of ribonuclease from goat milk.** *Indian Journal of Dairy Science* 44(8): 1991: 529-531

Goat milk ribonuclease eluted as a single peak on IRC-50 and CM-Cellulose column. It was purified to 550-fold. The purified enzyme exhibited an optimum temp. of 50 C and a pH of 9.0. AS

Milk products

2263

Showmaker (CF), Nantz (J), Bonnans (S) and Noble (AC). **Rheological characterization of dairy products.** *Food Technology* 46(1): 1992: 98-102, 104

The rheological properties of dairy products and their relationship to food structure is presented and discusses the results of a study to correlate rheological parameters and sensory texture evaluations of milk. CSA

2264

Holcomb (DN), Pechak (DG), Sumana Chakrabarti and Opsahl (A). **Visualizing textural changes in dairy products by image analysis.** *Food Technology* 46(1): 1992: 122-125, 127

The theoretical model that correlates the rheological and structural data which would allow prediction of the functional properties of a product from its microstructure is covered in this article. CSA

Butter

2265

Micich (TJ). **Behaviour of polymer-supported tomatine toward cholesterol in the presence or absence of butter oil.** *Journal of Agricultural and Food Chemistry* 39(9): 1991: 1610-1613

Insoluble carboxy-functionalized polystyrene-divinylbenzene copolymers were bonded to tomatine at 0.03 - 0.11 mmol of tomatine/g of polymer. Tomatine was added either to the poly(styrenecarboxyl chloride) or directly to the (carboxymethyl) polystyrene through the mediation of dicyclohexylcarbodiimide. Tomatinized polymers removed cholesterol from hexane sol. of butter oil or cholesterol; however, the complex formed in the presence of butter oil is of low stability. Cholesterol was completely removed and the polymers were regenerated by benzene extraction at room temp. Cholesterol bound to tomatinized polymers is not stable to 2-methyl-1-propanol extraction. Cholesterol uptake by tomatinized polymers was most efficient when hexane was the solvent. AS

2266

Kleyn (DH). **Textural aspects of butter.** *Food Technology* 46(1): 1992: 118-121

Aspects covered in this article are the characteristics of butter, manufacturing of butter (batch method, continuous method), factors affecting the spreadability of butter (seasonal diet, pretreatment of cream, treatment of butter), other approaches to improve the spreadability of butter (whipping,

blending, fractionation and interesterification) and measurement of textural properties. CSA

2267

Sharma (DK) and Balachandran (R). **High temperature vacuum deodorization for renovation of oxidized butter oil.** *Indian Dairyman* 44(6): 1992: 277-279

Oxidized butter oil could be renovated with standardized technique of washing and deodorization. The renovated butter oil which has a bland flavour is used in the preparation of recombined milk of high sensory quality. A fair quality (Grade C) ghee could be made by inducing ghee flavour in renovated butter oil along with cultured butter milk. GS

2268

Pruthi (TD) and Sudhir Kumar. **Effect of browning on recovery of phospholipids from clarified butter fat (ghee) by counter current of distribution technique.** *Indian Journal of Dairy Science* 44(8): 1991: 532-534

Chakka wheys

2269

Jadhav (PE), Kulkarni (MB) and Narawade (VS). **Factors influencing mineral content of *Chakka* whey.** *Indian Journal of Dairy Science* 44(8): 1991: 510-513

Detailed mineral make-up of *chakka* whey obtained from cow and buffalo milk systems at different stages of synergy of *dahi* was investigated. The study revealed that milk and the stages of draining had a significant ($P < 0.01$) influence on the mineral content of *chakka* whey. Further, it was noticed that the mean Ca, P, Mg, Na and K content in cow whey system at different stages of draining ranged from 101.96 to 126.91, 66.67 to 80.28, 6.20 to 8.69, 43.24 to 45.12 and 132.54 to 137.24 mg/100 ml respectively. The corresponding figures for the buffalo whey system were 121.60 to 192.77, 87.05 to 95.04, 9.02 to 15.78, 26.79 to 34.78 and 88.36 to 97.76 mg/100 ml. The pattern of the mineral distribution in cow and buffalo milk whey systems, as well as, in various stages of draining was complex. A large proportion of these minerals originally present in *dahi*/milk were drained out in the whey systems. AS

Cheese

2270

Konstance (RP) and Holsinger (VH). **Development of rheological test methods for cheese.** *Food Technology* 46(1): 1992: 105-109

Rheological analysis of cheese using various test methods such as empirical and imitative tests, fundamental tests, force-compression, creep, stress relaxation and small-amplitude oscillatory shear and its application to cheese which aids in the prediction of the textural quality of cheese is discussed in this review. 26 references. CSA

Cheddar cheese

2271

Trepanier (G), El Abboudi (M), Lee (BH) and Simard (RE). **Accelerated maturation of Cheddar cheese: Influence of added lactobacilli and commercial protease on composition and texture.** *Journal of Food Science* 57(4): 1992: 898-902

The influence of live and heat-shocked *Lactobacillus casei - casei* L2A and Neutrase® on the physicochemical and rheological parameters of Cheddar cheese in relation to the acceleration of ripening were studied. Results indicated that moisture, fat and salt percentages were comparable for all cheeses (moisture 51.7 to 52.97%, fat in solids from 51.19 to 53.38% and salt in moisture from 3.92 to 4.54%). Protein was higher in the experimental cheeses than in the control cheeses throughout maturation. Bacterial additives lowered the pH in cheese. The optimum treatment recomended was, LIVE LACTO + HS 1.0% + Neut A, to yield a good-quality matured Cheddar cheese with a flavour increase of 60%. GS

Gouda cheese

2272

Kanawjia (SK), Rajesh (P) and Singh (S). **Research in gouda cheese technology - A review.** *Indian Journal of Dairy Science* 44(8): 1991: 485-495

Gouda cheese is one of the most important Dutch type var. of cheese being produced in the world. In India it has great potential for acceptability by a larger segment of population due to its mild flavour. A great deal of work has been done to standardize the technique for its manufacture using cow and buffalo milk. An acceptable quality Gouda cheese now could by manufactured using microbial rennets. From the economic stand point, research investigation has resulted in achieving a good quality cheese produced within one month through the application of biotechnological means leading to a process of accelerated ripening. AS

Wheys

2273

Morr (CV). **Improving the texture and functionality of whey protein concentrate.** *Food Technology* 46(1): 1992: 110-113

This article describes the variability of commercial whey protein concentrate (WPC) and whey protein isolate (WPI) and possible processing modifications for manufacturing WPC and WPI with improved textural functionality and flavour (removal of low-mol.-wt. components, addition of ions and removal of residual lipids by microfiltration) that more closely resemble those of commercial WPI. CSA

2274

Mangino (ME). **Gelation of whey protein concentrates.** *Food Technology* 46(1): 1992: 114, 116-117

The article describes the electrostatic, covalent and hydrophobic forces that are important to the gelation properties of whey protein concentrates and discusses how composition influences the gel strength. CSA

2275

Yost (RA) and Kinsella (JE). **Microstructure of whey protein isolate gels containing emulsified butterfat droplets.** *Journal of Food Science* 57(4): 1992: 892-897

The effects of concn. and droplet size of anhydrous butterfat globules on the microstructure of heat-induced whey protein isolate gels (pH 4.60) were studied by scanning and transmission electron microscopy (TEM). All fat globules were emulsified with whey protein isolate and incorporated into the system prior to gelation. Protein aggregates became more closely packed as whey protein concn. was increased from 8 to 15% by wt. in gels without added fat. There was no notable change in overall gel microstructure upon addition of fat globules, up to 25% by wt., when viewed by scanning electron microscopy. However, it appeared fat globules were intimately associated with the gel protein matrix. A two-fold difference in fat globule size was obvious by TEM. Clusters of droplets became more predominant as butterfat content increased. AS

Whey proteins

2276

Beuschel (BC), Partridge (JA) and Smith (DM). **Insolubilized whey protein concentrate and/or chicken salt-soluble protein gel properties.** *Journal of Food Science* 57(4): 1992: 852-855

Properties of gels prepared from 5 whey protein concentrates (WPC) with protein solubilities ranging from 27.5% to 98.1% in 0.1M NaCl, pH 7.0, chicken breast salt-soluble protein (SSP), or a combination of SSP and WPC at pH 6.0, 7.0 or 8.0 were compared. WPC did not form gels when heated to 65 C. SSP gels heated to 65 C were harder than those heated to 90 C at all pHs and hardness decreased as pH was increased. Hardness of combination gels heated to 65 C increased as WPC solubility decreased at all pHs; however, the opposite trend was observed at 90 C. Combination gels of the same WPC solubility at 65 C were more deformable than those heated to 90 C. AS

Milk proteins

2277

Aynie (S), Le Meste (M), Colas (B) and Lorient (D). **Interactions between lipids and milk proteins in emulsion.** *Journal of Food Science* 57(4): 1992: 883-886, 891

The interactions between nitroxide homologs of fatty acids and purified components of milk proteins in a model food emulsion were studied using electron spin resonance. The importance of the interactions in emulsions decreased in the order α_{s1}-casein > β-lactoglobulin > β-casein whole casein. α_{s1}-Casein resulted in a better organization of the lipid monolayer. Neither the flexibility nor the tertiary structure of the proteins explained this result. It appeared that the interactions occurred through lipid polar heads and protein polar side chains due to hydrogen bonds and/or electrostatic interactions. AS

2278

Gothwal (PP) and Bhavadasan (MK). **Proteolytic hydrolysis of milk proteins as influenced by browning.** *Indian Journal of Dairy Science* 44(8): 1991: 501-509

Effect of browning as a result of sterilization under different pressure-time combination on the tryptic and peptic hydrolysis in cow and buffalo milk was studied. Proteins from raw buffalo milk were hydrolysed by trypsin to a lesser extent as compared to the proteins from raw cow milk. Sterilization brought about increase in proteolysis, the effect being more in buffalo milk than in cow milk. Moderate browning was accompained by improved rate of hydrolysis of proteins by trypsin, however, proteolysis in milk having severe browning was observed to be lower than in sample having moderate browning. Cane sugar reduced tryptic

hydrolysis when the milk was heated at 15 psi for 20 min, while heating upto 15 min had only negligible effect. Sterilization increased the rate of peptic hydrolysis of this fraction. The peptic hydrolysis of pH 2.2 insoluble protein fraction from cow and buffalo milk was not significantly affected by heating the milk at 15 psi for different intervals of time and the accompanying browning. Electrophoretic studies revealed that heat treatment involving moderate browning increased the rate of tryptic hydrolysis. While that involving severe browning resulted in decreased tryptic hydrolysis. Electrophoretic studies showed that heating conditions resulting in severe browning of milk also reduced peptic hydrolysis of pH 2.2 soluble protein fraction while it had only marginal effect on pH 2.2 insoluble fraction. AS

MEAT AND POULTRY

Meat

2279

Lind (I). **The measurement and prediction of thermal properties of food during freezing and thawing - a review with particular reference to meat and dough.** *Journal of Food Engineering* 13(4): 1991: 285-319

A literature review on the mathematical modelling of thermal properties and measuring methods is presented. Some measured values of the thermal properties of 3 different food products (unproven white bread dough, minced lean meat and minced lean meat mixed with lard, starch, salt and spices) are presented. The thermal properties of these 3 products are also calculated and compared with measured properties to check the validity of some of the existing formulas currently used for these product types. The importance of the temp. steps when using stepwise differential scanning calorimetry to measure the specific heat and enthalpies is discussed. The results show that there are formulas available for calculating accurately the apparent specific heat and the enthalpy change of these 3 very different food products. The calculations of the thermal conductivity, specific heat and ice content did not agree as well with the measured values, especially in the phase transition region. The apparent specific heat measurements showed the importance of selecting small enough temp. steps. AS

2280

De Zuniga (AG), Anderson (ME), Marshall (RT) and Iannotti (EL). **A model system for studying the penetration of microorganisms into meat.** *Journal of Food Protection* 54(4): 1991: 256-258

This study assessed the effect of line pressure used in spraying meat surfaces on removal of inoculated bacteria and on penetration of Blue Lake, an insoluble dye, into sprayed meat. Pressures used in this analysis were 690, 2070, 4140 and 6200 kPa. The highest pressure, 6200 kPa, removed significantly less aerobic bacteria than the other three lower pressures. No significant differences in removal of *Enterobacteriaceae* were noted due to pressure. Nozzle type was also a variable in the study on penetration. Type of nozzle had a significant effect on the penetration of the Blue Lake into the meat at a pressure of 6200 kPa. An equation describing penetration of the Blue Lake into the meat is given. AS

2281

Shelef (LA) and Yang (Q). **Growth, suppression of *Listeria monocytogenes* by lactates in broth, chicken and beef.** *Journal of Food Protection* 54(4): 1991: 283-287

Sodium or potassium lactate is available commercially as a neutral aqueous sol. (60%), approved for use as a flavouring agent in meat and poultry products. While recommended also for extending shelf-life, little work on its antimicrobial effects has been published and none in relation to *L. monocytogenes*. Studies in tryptic soy broth showed that concn. higher than 5% delayed growth of 3 strains of *L. monocytogenes*. Experiments in sterile comminuted chicken and beef at 35, 20 and 5° showed growth suppression by 4% lactate, which increased with decrease in storage temp. The organism was consistently more sensitive to lactate in beef than in chicken, displaying an extended lag phase of 1-2 wks at 5 C. Combinations of lactate (4%) with NaCl (3%) or nitrate (140 p.p.m.) did not enhance the effect. Lactate did not alter the beef or chicken pH, and no difference was observed between the effect of the two salts, inferring that the lactate ion is responsible for the delay in listerial growth. AS

Beef

2282

Goll (SJ), Kastner (CL), Hunt (MC) and Kropf (DH). **Glucose and internal cooking temperature effects on low fat, pre- and post-rigor, restructured beef roasts.** *Journal of Food Science* 57(4): 1992: 834-840

Addition of glucose to salt and phosphate (LEM-O-FOS) ingredient treatment as well as cooking to 93 C helped in maintaining low warmed-over flavour scores of restructured beef roasts and kept thiobarbituric acid values below

threshold (< 1.0) and maintained desirable consumer acceptability scores. GS

2283

Carter (RA), Plimpton (RFJr), Ockerman (HW), Cahill (VR) and Parrett (NA). **Fabricated beef product: Effect of handling conditions on microbiological, chemical and sensory properties.** *Journal of Food Science* 57(4): 1992: 841-844

Tenderness was more in fabricated beef roasts held at 54 C as compared to those at 60 C. A stabilizing period of 20 min at room temp. (-23 C) did not decrease yield, but caused slight lowering of sensory scores. Sensory evaluation scores were slightly lower with increased holding time (HT). Total microbial count was not adversely affected by lowering the holding temp. of the product from 60 to 54 C or by 12 h HT. GS

2284

Pszczola (DE). **Oat-bran-based ingredient blend replaces fat in ground beef and pork sausage.** *Food Technology* 45(11): 1991: 60, 63, 64, 66

This report provides a brief history on the development of the ingredient blend composed of specially processed oat bran with flavourings and seasonings. It also discusses the benefits that the fat-replacing ingredient offers to the ground beef and pork sausage; its applications and usage level and information on label approval. CSA

2285

Schoeni (JL), Brunner (K) and Doyle (MP). **Rates of thermal inactivation of *Listeria monocytogenes* in beef and fermented beaker sausage.** *Journal of Food Protection* 54(5): 1991: 334-337

2286

Van Laack (RLJM) and Smulders (FJM). **Microbiological condition of restructured steaks prepared from pre- and postrigor beef.** *Journal of Food Protection* 54(5): 1991: 357-359, 365

2287

Aramouni (FM) and Godber (JS). **Folate losses in beef liver due to cooking and frozen storage.** *Journal of Food Quality* 14(5): 1991: 357-365

Pork

2288

Prelusky (DB) and Trenholm (HL). **Nonaccumulation of residues in swine tissue following extended consumption of deoxynivalenol-contaminated diets.** *Journal of Food Science* 57(4): 1992: 801-802

Residues of deoxynivalenol (DON) in tissues of pigs fed DON-contaminated grains (6.0 - 7.6 mg DON/Kg feed) were not found to accumulate to any appreciable extent. BV

2289

Liu (HF), Booren (AM), Gray (JI) and Crackel (RL). **Antioxidant efficacy of oleoresin rosemary and sodium tripolyphosphate in restructured pork steaks.** *Journal of Food Science* 57(4): 1992: 803-806

Sodium tripolyphosphate (STPP) significantly reduced ($P < 0.01$) lipid oxidation in cooked pork steaks during refrigerated storage (= 4 C) for 8 days and in raw steaks stored at -30 C for 8 months. The addition of loeoresin rosemary (OR) to treatments containing STPP did not show enhancement ($P > 0.05$) of lipid stability. Water soluble OR/STPP also did not result in significant ($P > 0.05$) greater lipid stability than oil-soluble OR/STPP treatments. Hexanal content significantly ($P < 0.01$) increased after 8 months of frozen storage. GS

2290

Prusa (KJ), Fedler (CA), Sebranek (JG), Love (JA) and Miller (LF). **Acceptability and sensory analysis of pork summer sausage from pigs administered porcine somatotropin.** *Journal of Food Science* 57(4): 1992: 819-821

Summer sausage from the porcine somatotropin treated pigs and pork/beef blend was firmer and more chewy than that made from 100% pork. The beef/pork blend sausage was darker, more red and less yellow and was also acceptable more by consumers. GS

Products

2291

Gnanasambandam (R) and Zayas (JF). **Functionality of wheat germ protein in comminuted meat products as compared with corn germ and soy proteins.** *Journal of Food Science* 57(4): 1992: 829-833

Comminuted meat products (CCMP), frankfurters) with protein additives (wheat germ protein flour (WGPF), corn germ protein flour (CGPF), soy flour (SF)) at a level of 3.5% showed increased water-holding capacity and batter stability and decreased cooking loss. Improved viscosity and adhesiveness of meat batters with protein additives were observed when the level of added water was

constant. CMP containing WGPF and SF were firmer than those either containing CGPF or the control having the same level of added water. Protein additives also influenced textural and colour, aroma and flavour of frankfurters. WGPF at level of 3.5% was found similar to effects of SF and CGPF. WGPF, a potential nonmeat protein, can be utilized as an extruder in CMP such as frankfurters and bologna. BV

2292

Taki (GH). **Functional ingredient blend produces low-fat meat products to meet consumer expectations.** *Food Technology* 45(11): 1991: 70, 72, 74

The adaptation of the functional sprinkle-on seasoning to produce low-fat ground beef, sausage and other processed meats, as well as steaks, chops, meat loaf and other meat products for consumer and industrial use are discussed in this article. CSA

Ham

2293

O'Boyle (AR), Aladin-Kassam (N), Rubin (LJ) and Diosady (LL). **Encapsulated cured-meat pigment and its application in nitrite-free ham.** *Journal of Food Science* 57(4): 1992: 807-812

Microencapsulation by spray drying extended the shelf-life of the cooked cured-meat pigment dinitrosyl ferohemochrome (DNFH), to more than 1 yr. of the carbohydrate-based wall materials tested, the cyclic glucose polymer, β-cyclodextrin or combinations of it with gum arabic or maltodextrin, proved most effective. When encapsulated DNFH was dispersed in a nitrite-free pickle sol. and the dispersion treated to reduce particle size, the resultant "homogenized" pickle injected into fresh ham using a multiple-injection unit, and the pumped ham tumbled to accelerate the curing process, more uniform movement of DNFH was facilitated within the ham. An ideal process to produce a fine powder of DNFH within a narrow particle-size range without O_2. Under these conditions, complete dispersions of DNFH within intact meat tissue could be achieved and nitrite-free hams, and other similar cured-meat products, could be produced. BV

2294

Ventanas (J), Cordoba (JJ), Antequera (T), Garcia (C), Lopez-Bote (C), Asensio (MA). **Hydrolysis and Maillard reactions during ripening of Iberian ham.** *Journal of Food Science* 57(4): 1992: 813-815

Active proteolysis and autoxidation occured during the first period and a strong increase in amino acid and nitrogen was observed in the second period. Content of all the aldehydes decreased notably. GS

2295

Toldra (F), Aristoy (M-C), Part (C), Cervero (C), Rico (E), Motilva (M-J), Flores (J). **Muscle and adipose tissue aminopeptidase activities in raw and dry-cured ham.** *Journal of Food Science* 57(4): 1992: 816-818, 833

Poultry

2296

Brahmkshatri (BP), Upadhyay (NH), Patel (RH), Vataliya (PH), Joshi (RS), Khanna (K). **Inheritance of various egg quality characteristics in male line of white leghorn.** *Indian Journal of Poultry Science* 27(1): 1992: 57-58

The heritability study conducted with male line of White Leghorn indicated that the egg white was highly heritable, shell thickness was moderately heritable, albumen index and yolk index were lowly heritable. Egg wt. showed significant and positive genotypic correlations with shell thickness, albumen and yolk index, Haugh unit and yolk colour. Phenotypically negative correlations for egg wt. were observed with albumen index, Haugh unit and yolk colour. Albumen index and yolk index were significantly correlated genetically and phenotypically. It is concluded that selection for egg wt. will also bring simultaneous improvement in all egg quality traits. KAR

Chickens

2297

Thayer (DW) and Boyd (G). **Gamma ray processing to destroy *Staphylococcus aureus* in mechanically deboned chicken meat.** *Journal of Food Science* 57(4): 1992: 848-851

γ-radiation doses of 0.26 kGy and 0.36 kGy, administered *in vacuo* at 0 C, destroyed 90% of log-phase and stationary-phase CFU of *Staph. aureus* ATCC 13565 (FDA 196E), respectively, in mechanically deboned chicken meat (MDCM). Samples inoculated with $10^{3.9}$ CFU/g of *Staph. aureus* were treated with γ-radiation *in vacuo* at 0 C and then held for 20 h at 35 C (abusive storage). Viable CFU were found in samples irradiated to 0.75 kGy but not in those irradiated to 1.50 kGy either before or after storage. Enterotoxin was not detected in irradiated MDCM. A predictive equation was developed for the response of *Staph. aureus* in MDCM to radiation dose and irradiation temp. AS

2298

Sams (AR) and Diez (FN). **Characteristics of chicken frankfurters formulated with varying levels of pork and chicken fats.** *Poultry Science* 70(7): 1991: 1624-1629

Varying blends of pork and chicken fat (0:4, 1:3, 2:2, 3:1, 4:0 pork:chicken) were combined with lean (3% fat), hand-deboned chicken meat to determine the effects of substituting pork fat for chicken fat in low (22%) and high (27%) total fat level chicken frankfurter formulations. The addition of pork fat improved instrumental hardness, increased saturated fatty acid content, decreased monounsaturated fatty acid content, and did not significantly affect storage stability of the frankfurters. AS

2299

Anand (SK), Pandey (NK), Mahapatra (CM) and Verma (SS). **Changes in microflora during preparation and storage of chicken tandoori.** *Indian Journal of Poultry Science* 27(1): 1992: 51-53

Microbiological analysis was done at different stages of processing like dressed birds, after seasoning and prepared chicken tandoori stored at 5 plus or minus 1 C for 14 days on alternate days. The average aerobic counts on dressed bird were 5.36 log/g. During seasoning all types of bacteria except psychrotrops decreased. Cooking chicken tandoori in hot air oven at 175 C for 25 min decreased all bacteria, aerobic plate count reduced by > 2 log cycles, coliforms from 3.05 log to 0.61 log/g and psychrotrophs were completely eliminated. Stored chicken tandoori showed a gradual increase in total aerobes from an initial mean count of 3.32 log to 7.83/g on the 14th day of storage. KAR

Broilers

2300

Bailey (JS), Cox (NA) and Blankenship (LC). **A comparison of an enzyme immunoassay, DNA hydridization, antibody immobilization, and conventional methods for recovery of naturally occurring salmonellae from processed broiler carcasses.** *Journal of Food Protection* 54(5): 1991: 354-356

Three hundred and ninety raw processed broiler carcasses were obtained from 4 processing plants and evaluated for the presence of salmonellae by the whole bird rinse procedure. Enzyme immunoassay (Salmonella-Tek^{Tm}), colorimetric DNA hybridization (GENE-TRAK^{R}), and antibody immobilization (1-2 Test^{Tm}) methods were compared to the Food Safety Inspection Service (FSIS) culture method for detection of salmonellae. All samples were preenriched in buffered peptone water incubated at 37 C then transferred to and enriched in TT broth (Difco, Detroit, MI) incubated at 42 C for 24 h. After enrichment, manufacturer's instructions were then followed for "rapid" procedures and the FSIS recovery and confirmation scheme was followed for the cultural method. For each sample, if discrepant results were observed between the 4 procedures, selective plates were streaked from both the TT selective broth and the GN postenrichment broth (Difco). All samples which were positive after initial sampling of TT broth plus additional positive samples from TT selective and GN postenrichment broths were called confirmed cultural positives. Salmonellae were detected on 71% of the carcasses using confirmed cultural procedures and 65% with FSIS culture. Presumptive salmonella positive samples were found 66, 71 and 76% of the time with the 1-2 Test, GENE-TRAK, and Salmonella-Tek, respectively. As compared to confirmed culture, only 1.4% false positives were observed with the 1-2 Test and GENE-TRAK, whereas 6% false positives were obtained using Salmonella-Tek. When the false negatives for the 4 methods were compared to confirmed culture, Salmonella-Tek, Gene-TRAK, 1-2 Test, and FSIS culture had 0.4, 2.5, 7.2 and 8.3%, respectively. The close correlation of these rapid procedures to the conventional procedures warrants consideration of these procedures for detection of salmonellae from broiler chickens. AS

2301

Jones (FT), Axtell (RC), Rives (DV), Scheideler (SE), Traver (FRJr), Walker (RL), Wineland (MJ). **A survey of *Campylobacter jejuni* contamination in modern broiler production and processing systems.** *Journal of Food Protection* 54(4): 1991: 259-262

Campylobacter jejuni contamination was surveyed in samples collected from the breeder-multiplier houses, broiler houses, feed mills, hatcheries, and processing plants of two integrated broiler firms. Insects and mice were also trapped at each location. *C. jejuni* was most frequently found in samples collected from processing plants, followed by samples collected from broiler houses, and breeder-multiplier houses. Samples obtained from feed mills and hatcheries were negative, suggesting that the *C. jejuni* was not transmitted by either feed or eggs. *C. jejuni* was also not isolated from insect or mouse samples. However, the external surfaces of insects were sanitized with a chlorine sol., prior to analysis. Thus, these data suggest any contamination of insects with *C. jejuni* is generally external not internal. Contamination in broilers apparently originated from some unknown source(s) in broiler houses. *C. jejuni* was isolated from 20%

of the cloacal swabs taken as birds entered the plant, 52% of the carcasses sampled following immersion chilling, and 31.6% of whole broiler carcasses sampled at retail outlets. While these data suggest that cross-contamination occurred within processing plants, field control methods would appear to be necessary for control of *C. jejuni* in modern broiler production and processing systems. The frequent *C. jejuni* isolations from dead birds in broiler houses suggested the regular collection of normal mortality as one farm management procedure that might help reduce *Campylobacter* contamination in broilers. AS

Quails

2302

Singh (RP) and Panda (B). **Physico-chemical and sensory characteristics of brine-chilled frozen quail meat.** *Indian Journal of Poultry Science* 27(1): 1992: 1-5

The influence of brine chilling with or without polyphosphate on chilled carcass yield, brine uptake, cooking loss and frozen storage of quail meat is studied. Non-significant increases in water/brine uptake of carcasses chilled in salt or salt and phosphate brine compared to that of water-chilled control group were observed. Brine-chilling did not show adverse effect by way of excessive wt. gain by the carcasses. Polyphosphate addition to brine sol. significantly reduced cooking loss. Chilling of carcasses in salt alone did not show any effect on meat pH. Addition of sodium tripolyphosphate in brine sol. raised muscle pH, retarded lipid oxidation and showed synergistic effect on increasing myofibrillar proteins extractability and water holding capacity and reduced the cooking loss. GS

2303

Panda (SK) and Singh (RP). **Profitable disposal of quails as battered fried quail product.** *Poultry Guide* 29(7): 1992: 69-71

The paper describes the preparation of fried whole quail involving precooking, battering, seasoning and deep fat frying to get ready-to-cook quails. Fried quail can be served warm or packed in HDPE pouches (330 guage) and could be stored for 28 days at 4-5 C and 60 days at -10 C. GS

Turkeys

2304

Bater (B), Descamps (O) and Maurer (AJ). **Kappa-carrageenan effects on the gelation properties of simulated oven-roasted turkey breast juice.** *Journal of Food Science* 57(4): 1992: 845-847, 868

The soluble proteins in oven-roasted turkey breast juice with 2.2% salt (brine) and 0.5% phosphate started to gel at 52 C. k-carrageenan showed different swelling and gelling behaviour in different conditions: k-carrageenan started to swell at 46 C during heating and gel at 44 C during cooling. When NaCl contnet was changed to 0% or 4.4% and phosphate content to 0% or 1.2%, k-carrageenan started to swell at 28 C and gel at 36 C, or swell at 67 C and gel at 55 C, respectively. k-carrageenan in combination with turkey breast protein showed a significant ($P < 0.05$) synergistic increase in final gel strength; addition of 0.2% KCl or $CaCl_2$ further increased ($P < 0.05$) the synergistic effects. BV

2305

Chambers (L), Chambers (E) and Bowers (JR). **Consumer acceptability of cooked stored ground turkey patties with differing levels of phosphate.** *Journal of Food Science* 57(4): 1992: 1026-1028

The acceptability of turkey patties (fresh and stored, cooked, ground) without added phosphate was < those with 0.25% or 0.5% added sodium tripolyphosphate (STPP). Stored samples with 0.5% STPP had more meaty flavour than those without phosphate. Samples containing 0.5% STPP were found less firm and more juicy than the other samples. Consumers also reported higher off-flavour in fresh and stored samples without STPP and; 0.5% STPP-treated samples showed lower off-flavour after storage. BV

Products

Eggs

2306

Hsien (YL) and Regenstein (JM). **Modelling gelation of egg albumen and ovalbumin.** *Journal of Food Science* 57(4): 1992: 856-861

The Flory gelation theory and a new protein gelation model were used to investigate the aggregation reactions of egg albumen and ovalbumin. Results showed that 178 to 267 ovalbumin monomers were required to establish the initial ovalbumin gel at the gel point temp., 81 C. The gel point temp. for egg albumen was 72 C by the Instron and 60 C by protein solubility. The values of the activation energy rate constants for the formation of the different aggregates in the pre-gel stage suggested that the larger ovalbumin aggregates were more reactive than the smaller ones. AS

2307

Hsieh (YL) and Regenstein (JM). **Elastic attributes of heated egg protein gels.** *Journal of Food Science* 57(4): 1992: 862-868

The equilibrium stress of egg white (EW) and ovalbumin (OV) gels using the statistical theory of rubber elasticity suggested that 3.9 covalent disulphide cross-links per OV molecule were formed on gelling. DTNB and PCMB reacted with approx. 4 sulphydryls of OV in 2% SDS and/or at 82 C. Moreover, the equivalent of 3 secondary bonds, calculated from the initial stress and presumably a composite of numerous weak secondary bonds, contributed significantly to the protein gel stress. AS

2308

Fontana (A), Antoniazzi (F), Cimino (G), Mazza (G), Trivellone (E), Zanone (B). **High-resolution NMR detection of cholesterol oxides in spray-dried egg yolk.** *Journal of Food Science* 57(4): 1992: 869-872, 879

Reports an alternative method for the detn. of cholesterol oxidation in egg powder. The quantitative analysis of cholesterol oxides was carried out by high-resolution proton nuclear magnetic resonance (^{1}H-NMR). The following oxides were isolated from spray-dried egg powder by rapid chromatographic procedures and detected by selecting "marker" ^{1}H-NMR signals: 7-ketocholesterol, 7α-hydroxy-cholesterol, 7β-hydroxy-cholesterol, cholesterol-α-epoxide and cholesterol-β-epoxide. The quantified cholesterol derivatives ranged from 4.9 to 9.1 p.p.m. with a detection limit of 0.3 p.p.m. (5 µg from 16 g of matrix). The main usefulness of the method should be investigating intermediates and products due to chemical transformation of cholesterol during storage and heating of foodstuffs. AS

2309

Pike (OA), Huber (CS) and Baker (RC). **Acceptability of broken-out eggs stored in polypropylene containers.** *Poultry Science* 70(7): 1991: 1644-1646

The results of the present study indicate that broken-out eggs can be stored at refrigerated temp. in polypropylene containers for at least 3 months and still be as acceptable as shell eggs similarly stored in regard to physical quality, microbial stability, and sensory evaluation. Polypropylene packaging with refrigerated storage could enhance the feasibility of utilizing eggs in spaceflight menus, military rations, and other settings having an environment hostile to shell eggs. BV

2310

Kesava Rao (V), Ravindra Sharma and Kulkarni (VV). **Maintenance of quality of shell eggs.** *Poultry Guide* 29(7): 1992: 43-50

Better methods of collection, storage, packaging, transport, retailing and distribution of eggs to prevent deterioration are discussed. Other aspects included are: processing (cooling and washing) and oil coating of eggs. GS

2311

Germs (AC). **Mechanisms for the decrease in lecithin-P_2O_5 (egg yolk) content in egg noodles.** *Deutsche Lebensmittel-Rundschau* 87(6): 1991: 183-185

The possible reasons (enzymatic degradation and complex formation of lecithin) for a decrease in determined lecithin-P_2O_5 (egg yolk) content during manufacture and storage of egg noodles are reviewed. Recent findings show that autoxidized phospholipids have a strong tendency to form complexes with other compounds support the view that this can also account for an (apparent) reduction in lecithin-P_2O_5 content in egg noodles. 36 references. BV

SEAFOODS

2312

Chinnamma George and Gopakumar (K). **Modified method for the estimation of pentose sugar in molluscan shell fishes.** *Science and Culture* 57(1/2): 1991: 45-47

Molluscan shell fishes such as mussels and clams contain glycogen at very high levels; consequently estimation of pentose sugar by Mejbaum method gives erratic results. By this modified procedure correct values of pentose sugar is obtained. SD

Crustaceans

2313

Renon (P), Biondi (PA) and Malandra (R). **HPLC determination of formaldehyde in frozen crustaceans.** *Italian Journal of Food Science* 3(1): 1991: 59-62

In the present work the content of formaldehyde in frozen crustaceans was evaluated by a method which entails the following steps: a) steam distillation from acidic extract; b) derivatization with 2,4-dinitrophenylhydrazine; c) extraction in hexane; d) analysis of formaldehyde derivative by reversed-phase HPLC with spectrophotometric

detection. The method appears reproducible and suitable for use in routine analysis of formaldehyde in crustacean specimens. AS

Shrimps

2314

Chen (H-C), Huang (S-H), Moody (MW) and Jiang (S-T). **Bacteriocidal and mutagenic effects of ozone on shrimp (*Penaeus monodon*) meat.** *Journal of Food Science* 57(4): 1992: 923-927

The study reports solubility and stability of ozone in liquid phase and the effect of ozone on the inactivation of some bacterial strains suspended in saline or seeded in shrimp meat. The formation of mutagens in shrimp meat soaked with ozone flushing and the ozonolysis of DNA in phages and bacteria when they were treated in ozonated water with concn. used for disinfection was also observed. Results indicated that the saturated concn. (1.4 mg - O_3/L) of ozone in shrimp meat extract (SME) was lower than in 2% saline in distilled water at 5 and 25 C. Ozone exhibited the same decomposition rate ((2.66%)/min) in SME either at 25 or 5 C, within 25 min after ozonation was stopped. *Salmonella typhimurium* was more resistant to ozone in shrimp meat among the 9 bacterial strains tested. Shrimp meat immersed in saline (2%) containing 5 mg - O_3/L, for 120 min, did not show mutagen formation. Ozone in saline (< 5 mg - O_3/L) could lyse M13 RFDNA *Escherichia coli* and single stranded DNA in phage M13 outside bacterial cell, within 30 min. GS

Squids

2315

Nagashima (Y), Ebina (H), Nagai (T), Tanaka (M) and Taguchi (T). **Proteolysis affects thermal gelation of squid mantle muscle.** *Journal of Food Science* 57(4): 1992: 916-917, 922

Thermal gelation of squid mantle muscle was studied by means of gel strength measurement and SDS-polyacrylamide gel electrophoresis (SDS-PAGE). The gel strength of thermally induced squid meat gel decreased when squid meat paste was heated in two steps (35 C for 30 min followed by 90 C for 30 min). This decrease in gel strength was effectively depressed by the addition of protease inhibitors such as ethylenediaminetetraacetic acid (EDTA), phenylmethylsulfonyl fluoride (PMSF), and soybean trypsin inhibitor, indicating that metallo- and/or serine-proteases were mainly involved in the deterioration of squid meat gel prepared by two-step heating. SDS-PAGE analysis demonstrated that EDTA or PMSF suppressed the degradation of myosin heavy chain. AS

Fish

2316

McMeekin (TA), Ross (T) and Olley (J). **Application of predictive microbiology to assure the quality and safety of fish and fish products.** *International Journal of Food Microbiology* 15(1/2): 1992: 13-32

2317

Huss (HH). **Development and use of the HACCP concept in fish processing.** *International Journal of Food Microbiology* 15(1/2): 1992: 33-44

2318

Chan (JK), Gill (TA) and Paulson (AT). **Cross-linking of myosin heavy chains from cod, herring and silver hake during thermal setting.** *Journal of Food Science* 57(4): 1992: 906-912

Electrophoretic results showed that the myosin heavy chain (MHC) was the principal myofibrillar protein cross-linked to form a polymerized complex during the heat treatment. Cross-linking ability of MHC from the 3 fish sp. was different: Herring (*Clupea harengus*) MHC formed only small polymers (n less than or equal to 3) but cod (*Gadus morhua*) and silver hake (*Merluccius bilinearis*) MHC formed both small and large polymers (n greater than or equal to 6). BV

Salmon

2319

Boyle (JL), Lindsay (RC) and Stuiber (DA). **Bromophenol distribution in salmon and selected seafoods of fresh- and saltwater origin.** *Journal of Food Science* 57(4): 1992: 918-922

Analysis of saltwater Pacific salmon (*Ochorynchus sp.*) showed that sufficient concn. of bromophenols were present in saltwater salmon to provide sea-, brine-, or iodine- like flavour notes, but the compounds were virtually absent in spawning run ocean and prime condition Great Lakes freshwater salmon. Octanol/water partition coeff. revealed that bromophenols would be readily absorbed by fish from the diet. Analysis of marine fish, crustaceans, and molluscs also revealed notable concn. of bromophenols in all samples. Only sporadic, low concn. of bromophenols were found in freshwater fish. The data support the hypothesis that simple bromophenols are widely distributed in marine sp. via the food chain. AS

Tuna

2320
Banga (JR), Alonso (AA), Gallardo (JM) and Perez-Martin (RI). **Degradation kinetics of protein digestibility and available lysine during thermal processing of tuna.** *Journal of Food Science* 57(4): 1992; 913-915

Canned white tuna (*Thunnus alalunga*) was subjected to thermal processing with olive oil and the changes in available lysine and protein digestibility were evaluated. Thermal degradation of available lysine in tuna white muscle was a first-order kinetic process. An empirical psuedo n-th order kinetic model, with n = 13.4 was found optimum for protein digestibility weighed stochastic non-linear regression and the *Jackniſe* procedures are successful in calculating kinetic parameters (k_o, E_a, n). GS

PROTEIN FOODS

Infant foods

2321
Rossi (M) and Pompei (C). **Changes in liquid milk-based infant formulas during heat treatments.** *Italian Journal of Food Science* 3(1): 1991: 39-47

A basic formula of modified infant milk was subjected to heat treatments of various intensities in industrial plants. The effect of the treatments on various chemical and physical parameters was evaluated. On the basis of the time/temp. profiles relative to both the UHT plants and the hydrostatic sterilizer used for sample sterilization, a C_o value, expressed as min at 100 C, was assigned to each treatment. Highly significant, linear correlations were observed between heat treatment intensity and lactulose, soluble whey protein and free hydroxymethylfurfural, respectively. This study leads to the conclusion that these 3 parameters are sound indices of heat damage during both UHT and incontainer sterilization of modified infant milk. AS

2322
Rossi (M) and Pompei (C). **Changes in liquid milk-based infant formulas during long-term storage.** *Italian Journal of Food Science* 3(1): 1991: 49-57

Samples of modified infant milk produced using heat treatments of different intensities were stored for up to approx. 18 months at 4, 20 and 38 C. The evolution over time of various chemical and physical parameters was evaluated. Results were processed with a multivariate analysis of the principle components. On the basis of component wts., the most relevant variables were found to be colour difference, pH, NPN, lactulose and non-casein nitrogen (NCN), in that order. Except with regard to NCN, the extent of variation observed during storage was temp. dependent. A practical tool for product quality control, based on pH and lactulose analysis, is proposed. AS

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

2323
Pons (M-N) and Chanel (S). **Effect of heavy metals on volatiles production in alcoholic fermentation by *Saccharomyces cerevisiae*.** *Journal of Fermentation and Bioengineering* 72(1): 1991; 61-63

The effect of inhibition by metals (Cu, Co, Cd and Pb) on the production of volatiles during alcoholic fermentation was investigated by means of a gas membrane sensor connected to a gas chromatograph. Acetaldehyde kinetics were strongly affected by this inhibition, which increased also the fermentation duration and decreased the ethanol and isoamyl alcohol yields. AS

Alcoholic beverages

2324
Falcone (F). **Migration of lead into alcoholic beverages during storage in lead crystal decanters.** *Journal of Food Protection* 54(5): 1991: 378-380

The Pb content of various alcoholic beverages stored in Pb crystal decanters has been determined over a period of 60 wks, using graphite furnace AAS. After 60 wks the levels of Pb ranged from 116 to 2576 p.p.b. Seven of the 9 samples had Pb levels above the max. allowable level of 200 p.p.b. AS

Beer

2325
Hamberg (M). **Trihydroxyoctadecenoic acids in beer: Qualitative and quantitative analysis.** *Journal of Agricultural and Food Chemistry* 39(9): 1991: 1568-1572

Linoleic acid derived 9, 10, 13- and 9, 12, 13-trihydroxyoctadecenoic acids present in beer were subjected to stereochemical analysis by a method recently developed. Although all of the 16 possible isomers were detected, ca. 60% of total

9,10,13- and 9,12,13-trihydroxyoctadecenoates was accounted for by a single isomer, i.e., 9(S), 12(S), 13(S)-trihydroxy-10(E)-octadecenoic acid. A method for quantitative detn. of 9,10,13- and 9,12,13-trihydroxyoctadecenoic acids was developed. Application of the method to 5 samples of beer showed that the mean concn. of 9(S), 12(S), 13(S)-trihydroxy-10(E)-octadecenoic acid was 5.9 plus or minus 1.1 μg/g and that the total concn. of 9,10,13- and 9,12,13-trihydroxyoctadecenoic acid isomers was 9.9 plus or minus 2.1 μg/g of beer. AS

2326

Hay (BA) and Homiski (JW). **Efficient one-step preparation of beer additive tetrahydroiso α-acids.** *Journal of Agricultural and Food Chemistry* 39(10); 1991; 1732-1734

α-Acids from hop extracts are simultaneously isomerized and hydrogenated to yield tetrahydroiso α-acids, an important additive in beer. The α-acids can also be sequentially isomerized and hydrogenated to tetrahydroiso α-acids, provided the hydrogenation is done between pH 6.0 and pH 11.0. The process is ideally suitable to scale-up and is more cost effective than any other route. The product has a higher purity than material produced by use of other reported methods. Hexahydroiso α-acids, a related beer additive, are also prepared in one step from α-acids. AS

2327

Kaneda (H), Kimura (T), Kano (Y), Koshino (S), Osawa (T), Kawakishi (S). **Role of fermentation conditions on flavour stability of beer.** *Journal of Fermentation and Bioengineering* 72(1); 1991; 26-30

To clarify the role of wort fermentation conditions on the stability of the resulting beer; the flavour stability of beers brewed at several fermentation temp. (6 - 30 C) in a pilot brewing plant (30 l) was studied using chemiluminescence analysis. Chemiluminescence (CL) production in fresh and stored beers increased with fermentation temp. Flavour stability of the beers increased with decreasing fermentation temp. Sulphite content in the fresh beer decreased with an increase in fermentation temp. When sulphite was added to beer, the CL production in beers before and after storage decreased and the flavour stability increased with the concn. of sulphite. These data showed that it was an advantage for beer flavour stability to increase the sulphite level during fermentation. In this pilot study, the CL producing activity had a negative relationship with sulphite content in beer and with flavour stability, indicating that the CL producing pattern of beer is a useful indicator for the evaluation of beer stability in the development of a more stable beer. AS

2328

Kida (K), Ikbal, Sonoda (Y), Kawase (M) and Nomura (T). **Influence of mineral nutrients on high performance during anaerobic treatment of wastewater from a beer brewery.** *Journal of Fermentation and Bioengineering* 72(1); 1991; 54-57

The BOD of wastewater from beer breweries is around 2,000-3,000 mg/l, which is considered to be low-strength wastewater; however, high-strength wastewater, known sometimes as trube wastewater (BOD, about 80,000 mg/l), is also produced as a result of the filtration of wort. This high-strength wastewater was found not to respond well to treatment by a mono-phase thermophilic methane fermentation process using an anaerobic fluidized-bed reactor. Considering the composition of the wastewater and the pathway for methane fermentation, NH_4^+ at 500 mg/l, Ni^{2+} at 7 mg/l, Co^{2+} at 2 mg/l and Fe^{3+} at 30 mg/l were added to the wastewater. After five-fold dilution by vol., the diluted wastewater treated anaerobically in the same manner. As a result, the TOC (total organic carbon) concn. in the effluent was constant at about 400 mg/l, and no further problems were encountered. The volumetric loading rate of TOC was studied by treating variously diluted samples of high-strength wastewater (TOC 15,000, 23,500, 47,000 mg/l). The results obtained with the raw wastewater (TOC 47,000 mg/l) were remarkably good, with a max. volumetric loading rate of TOC of 14 g/l.d, a gas yield of 1.2 l/g TOC consumed and a methane content of 59%. From tests involving omission of the mineral nutrients, it appears that Ni^{2+} and Co^{2+} play important roles in the anaerobic treatment of the wastewater. AS

Whiskeys

2329

Headley (LM) and Haray (JK). **Adulterants in whiskey: Detection and identification by principal component analysis.** *Journal of Food Science* 57(4); 1992; 980-984

Model adulterants such as gasoline, phenol, rubber hose, and hair were added to whiskies to prepare adulterated samples. Methylene chloride extracts of these and of the unadulterated whiskies were separated by capillary column GC. Principal Component Analysis was applied to the gas chromatograms, and the resulting scores were used to decide upon product acceptability. Using a series of standards, scores were also the basis of identification of adulterants in rejected samples. In the largest of 3 data sets, decisions were correct for over 95% of samples, and all adulterated samples were correctly identified. AS

Wines

2330

Miranda-Lopez (R), Libbey (LM), Watson (BT) and McDaniel (MR). **Odor analysis of Pinot Noir wines from grapes of different maturities by a gas chromatography-olfactometry technique (osme).** *Journal of Food Science* 57(4): 1992: 985-993, 1019

The changes in aroma compounds with fruit maturity and vintage were studied using a gas chromatography-olfactometry technique (osme) by comparing the odour quality and number of odour peaks across maturities and vintages of Pinot noir wines. It was observed that odour character varied notably depending upon the climatic conditions in a given harvest season. In the consensus Osmegram, certain peaks appeared, disappeared or changed in odour intensity, depending on the degree of grape ripeness. Wines made with grapes harvested at the end of the ripening period has more odour-active peaks than wines made from fruits harvested before ripening. GS

Rice wine

2331

Ueki (T), Teramoto (Y), Ohba (R), Ueda (S) and Yoshizawa (K). **Application of aromatic red rice bran to rice wine brewing: Studies in red rice wine brewing (Part 2).** *Journal of Fermentation and Bioengineering* 72(1): 1991: 31-35

Rice wines were made from various kinds of rice and/or rice brans. The aromatic red rice wine made from unpolished aromatic red rice (*Oryza sativa* var. *Indica*, *Tapol*), having a wine-like fruity aroma and sour taste, showed the highest quality, while rice wine made from polished aromatic red rice showed a lower quality in an organoleptic test and GC analysis. Rice wines made from the bran of aromatic red rice and red rice, the waste product of the polishing process in *Sekihan* cooking, contained 2.5 times greater amounts of higher alcohols and 3.5 - 5.0 times greater amounts of volatile esters than rice wines made from the bran of glutinous and nonglutinous rices. Thus, the bran fraction of aromatic red rice was essential for the formation of a ruby colour and fruity aroma. Various amounts of aromatic red rice bran were mixed with polished aromatic red rice and also applied to rice wine brewing. Rice wine made from 10 g of bran and 21 g of polished aromatic red rice showed the best quality according to the organoleptic test and GC analysis. The optimal ratio of bran to polished rice as a raw material for rice wine brewing was almost equal to that of native unpolished rice. Aromatic red rice bran was further mixed with polished glutinous rice or nonglutinous rice and applied to rice wine brewing. The resulting rice wines had a characteristic ruby colour and fruity aroma, just the same as the aromatic red rice wine made from native unpolished aromatic red rice. Thus, not only native unpolished aromatic red rice, but also its bran, could be applied directly and economically to rice wine brewing without the need for any complicated process. AS

Non-alcoholic beverages

Coffee

2332

Guyot (B), Cochard (B) and Vincent (J-C). **Quantitative determination of dimethylsulphide and dimethyldisulphide in coffee aroma. Application to stinking roasted Arabica coffees.** *Cafe-Cocoa-The* 35(1): 1991: 49-56 (Fr)

Fruit juices

Apple juices

2333

Carelli (AA), Crapiste (GH) and Lozano (JE). **Activity coefficients of aroma compounds in model solutions simulating apple juice.** *Journal of Agricultural and Food Chemistry* 39(9): 1991: 1636-1640

Infinite dilution activity coeff. ($\gamma^{infinity}$ of several alcohols, aldehydes and esters, considered to be the major components of apple aroma, were measured in model food sol. containing glucose, fructose, sucrose and malic acid. Measurements were made by following the dilution exponential method, at temp. ranging from 25 to 68 C. Experimental data were correlated with the one-parameter Wilson model. The results reveal that $\gamma^{infinity}$ values for a homologous series increase with the length of the carbon chain. $\gamma^{infinity}$ values of lower alcohols and esters increase with temp., while $\gamma^{infinity}$ values for heavier aromas either decrease or remain practically constant with temp. Apple juice solutes increase the activity coeff. of most of the aroma compounds studied. AS

2334

Burda (K) and Collins (M). **Adulteration of wine with sorbitol and apple juice.** *Journal of Food Protection* 54(5): 1991: 381-382

One hundred and thirty-nine Australian wines, including white and red wines, port, sherry and muscat, were analyzed for sorbitol and chlorogenic acid in connection with the adulteration of wine with sorbitol and apple juice, respectively. Sorbitol was

found in 10 wines in the range 3.4 - 6.7 g/L, well above the likely natural level of 0.1 - 1.0 g/L. The detection limit for sorbitol was 0.1 mg/L. In a further 5 wines, chlorogenic acid was found in the range 10 - 31 mg/L. The natural occurrence of chlorogenic acid in wine is < 2 mg/L. The detection limit for chlorogenic acid in white and red wines was 0.5 mg/L and 1.0 mg/L, respectively. AS

2335

Sharma (DD), D'Souza (VF) and Mazza (G). **Psychological and psychometric evaluation of commercial apple juices.** *Journal of Food Quality* 14(5): 1991: 391-405

Five commercial apple juice samples with sugar 9.6 - 10.6%, acid 0.40 - 0.51% and phenolic content 0.12 - 0.23% evaluated showed a correlation of 0.92 between sweetness intensity (log) and sugar; 0.93 between sourness intensity (log) and acid; -0.92 between sourness intensity (log) and sugar/acid ratio; 0.95 between bitter/astringent taste (log) and phenolic content and 0.91 between bitter/astringent taste (log) and acid. Preference ranged from 5.7 - 7.9 and did not correlate with chemical contents or ratios or sensory intensities. Aroma intensity with sugar showed 91% coverage and aroma intensity with sweetness intensity 99% coverage of the preference. SD

2336

Konczal (JB), Harte (BR), Hoojjat (P) and Giacin (JR). **Apple juice flavour compound sorption by sealant films.** *Journal of Food Science* 57(4): 1992: 967-969, 972

An efficient method for analysis of flavour compounds in apple juice is presented; and investigates the sorption of 4 flavour compounds (ethyl-2-methyl-butyrate, hexanal, trans-2-hexenal and 1-hexanol) found in apple juice by selected plastic heat sealable films (LDPE, ethylene/vinyl alcohol ((EVOH) copolymer of high ethylene content, and co-polyester (Co-PET)). The amount of each flavour sorbed by the heat sealable films as a function of storage time varied with the polymer. Sorption of volatiles from apple juice, polymers, EVOH and Co-PET were less sorptive than LDPE, when in direct contact. BV

Ciders

2337

Scott (JA). **The influence of sub-cellular material and pH on cross-flow membrane clarification of cider fermentation broths.** *Journal of the Institute of Brewing* 97(4): 1991: 291-295

The application of cross-flow filtration for clarifying fermentation broths with both micro- and ultra-porous membranes is considered. Steady state fluxes with broths can be less than 10% of clean water values and a significant cause in addition to yeast cells was identified as material with sub-cellular dimensions (found both in the medium and generated during the fermentation). Further work also showed that altering solution pH will also markedly reduce fluxes, in particular those through micro-porous membranes. AS

Kinnow

2338

Ranote (PS), Bawa (AS) and Saini (SPS). **Thermal process for Kinnow-RTS.** *Indian Food Packer* 46(2): 1992: 16-20

The thermal process time of Kinnow ready-to-serve (RTS) beverage based on heat inactivation of pectin methylesterase using improved graphical method were 27 min for bottle and 15 12 min for pouched beverage. Kinnow-RTS beverage, packed in flexible pouch, rigid bottle and metallic containers when stored at 12 - 38 C showed negligible changes in rheology, pH and chemical constituents when evaluated for its shelf-life, during 24 wk storage. During storage sugars increased slightly; residual ascorbic acid and recoverable oil could not be detected. Tintometric colour did not change much. Products in metallic and glass containers were superior in sensory quality than those in pouches; yet flexible pack is recommended because of its energy saving, low cost and time saving. GS

Orange juices

2339

Klavons (JA), Bennett (RD) and Vannier (SH). **Nature of the protein constituent of commercial orange juice cloud.** *Journal of Agricultural and Food Chemistry* 39(9): 1991: 1545-1548

The cloud of 5 commercial orange juice concentrates contained an average of 52.4% protein. Most of the cloud protein was soluble in the chaotropic reagent 10 M urea-6% citric acid, pH 2.5. The cloud of two ready-to-serve pasteurized orange juices showed much the same behaviour as the concentrates, although the total cloud wt. and cloud protein contents were less. Some of the cloud appears to be formed during juice processing. The primary causes of the protein insolubility in the juice are due to inherently insoluble protein, complex formation with low mol. wt. organic cloud constituents, and covalent bonding to other cloud constituents. Protein-pectin complex formation is believed to play only a minor role. AS

Pear juices

2340

Grewal (VS) and Saini (SPS). **Compositional changes during thermal proccessing of *Pyrus pyrifolia* juice into concentrate.** *Indian Food Packer* 46(1): 1992: 21-26

Technology for preparing concentrate (60°Brix) from pear is described. The fruit was converted into juice and concn. was carried out in a vacuum evaporator at a vacuum of 28.5 plus or minus 1.5" of Hg and at 50 - 55 C; 320 ml water/h could be evaporated. The energy consumption was 0.75 kg steam per 0.32 kg water. The concn. was single effect, single stage, batch type. During concn. there were changes in flow characteristics; invert sugars improved; total sugars remained constant; pectin and ascorbic acid declined (59%). pH showed no change; juice viscosity increased. Heat treated fruit juice concentrate had better sensory acceptability with higher colour and flavour scores. Possibility of preparing acceptable quality pear juice concentrate has been indicated. GS

FATS AND OILS

2341

Wang (Y) and Gordon (MH). **Effect of lipid oxidation products on the transesterification activity of an immobilized lipase.** *Journal of Agricultural and Food Chemistry* 39(9): 1991: 1693-1695

The effect of varying amounts of linolenic acid hydroperoxides on the activity of an immobilized lipase. Lipozyme, used for the transesterification of fats has been studied. The initial activity of the enzyme is not significantly reduced even by a peroxide value (PV) of 50 mequiv/kg, but the operational stability is reduced if the peroxide value of the oil in above 5 mequiv/kg, with the rate of enzyme inactivation increasing with PV. A sample with initial PV of 50 mequiv/kg caused a 50% loss of activity after 8 batch treatments of 10 h per treatment. The loss of activity is due to generation of free radicals in the enzyme following hydroperoxide decomposition. AS

2342

Bhirud (VS), Subrahmanyam (VVR) and Vaidya (SD). **Preparation of water soluble organic acid esters of monoglycerides using *Mucor miehei* lipase.** *Journal of the Oil Technologists Association of India* 23(4): 1991: 61-63

Lactic, citric and succinic acid esters of glycerol-monostearin are prepared using immobilized *M. miehei* lipase as catalyst. 1-monostearin was prepared by hydrolysis of 1,2-isopropylidene glycerol-ester of stearic acid obtained by using lipase as catalyst. Bread was prepared using oxygen of the monoglyceride or its derived esters. The esters greatly improved the freshness and softness of the bread than the parent monoglyceride. The effect of addition of lactated and citrated 1-monostearin is similar, while both of them are better than succinated 1-monostearin in maintaining the bread quality. GS

2343

Bhirud (VS), Subrahmanyam (VVR) and Vaidya (SD). **Hydrolysis of oils and fats using *Candida rugosa* lipase.** *Journal of the Oil Technologists Association of India* 23(4): 1991: 63-64

Coconut, safflower, soybean, groundnut, rice bran and castor oils having saponification values (SV) of 255, 193.0, 192.7, 194.2, 190.0 and 186.9 respectively were tested for fat splitting. Sal (*Shorea robusta*) and Mahua (*Bassia latifolia*) fats (SV 186.8 and 191.7 respectively) were also investigated. *Candida rugosa* lipase having an activity of 30,000 lipase units (LU) per g was used as the catalyst for fat splitting. The acid value (AV) was determined occurred in coconut, safflower, soybean and groundnut oils in 16 h at 40 C and at a pH of 5.4, with *Candida rugosa* lipase as catalyst. Increasing the pH from 5.4 to 6.4, decreased the hydrolysis by about 10 units in all cases. But for castor oil and rice bran oil, 24 h was needed for 95% hydrolysis. In mahua and sal, high degree of splits were obtained by carrying out the reaction for 24 h but in 16 h the degree of splits achieved was lower. GS

Fats

2344

Kennedy (JP). **Structured lipids: Fats of the future.** *Food Technology* 45(11): 1991: 76, 78, 80, 83

Aspects covered are the medium-chain triglycerides, structured lipids, its advantages (improves immune function, does not impair reticuloendothelial system, lessens cancer risk, helps prevent thrombosis, lowers cholesterol, improves N balance) and implications. CSA

Oils

2345

Nasirullah, Ankaiah (KN), Krishnamurthy (MN) and Nagaraja (KV). **Quality characteristics of edible**

vegetable oil blends. *Journal of the American Oil Chemist's Society* 68(6): 1991: 446-447

Two edible oil blends, namely groundnut oil:rice bran oil and mustard oil:rice bran oil, were prepared in different proportions and stored for a period of three yrs. Their physicochemical characteristics were determined. The results agreed with expected values except for free fatty acid percents and butyrorefractometer readings, presumably due to rancidity. Fatty acid compositions of the blends were determined and ratios of characteristic fatty acids, like lignoceric to palmitic for groundnut oil:rice bran oil blends, and erucic to palmitic for mustard oil:rice bran oil blends, were calculated to identify individual oils in the blend. AS

2346

Lanser (AC), List (GR), Holloway (RK) and Mounts (TL). **FTIR estimation of free fatty acid content in crude oils extracted from damaged soybeans.** *Journal of the American Oil Chemist's Society* 68(6): 1991: 448-449

A user-interactive computer-assisted Fourier transform infrared (FTIR) method has been developed for estimation of free fatty acids (FFA) in vegetable oil samples by deconvolution of the infrared (IR) absorbances corresponding to the triglyceride ester and FFA carbonyl bonds. Peak areas were used to determine FFA as a percentage of the total carbonyl areas in weighed standards of refined, bleached, deodorized soybean oil containing from 0 to 5% added oleic acid. These data for percent FFA by FTIR were compared to corresponding FFA data obtained by two titration methods - the AOCS Official Method Ca 5a-40 and the Official Method with a slight modification. Correlation coeff. were 0.999 for the Ca 5a-40, 0.999 for the modified and 0.989 for the FTIR methods. FFA in samples of crude soybean oils extracted from damaged beans (0.5 to 2.1% FFA) were measured by FTIR and compared to data obtained by titration of the same samples (correlation coeff., 0.869). AS

Rice bran oils

2347

El-Zanati (EM) and Khedr (MA). **Separation of saturated and unsaturated acids from rice bran oil.** *Journal of the American Oil Chemist's Society* 68(6): 1991: 436-439

Rice bran oil, a by-product of rice milling, is an excellent source of a variety of fatty acids. Saponification yielded C_{16} saturated and C_{18} unsaturated acids. Saturated and unsaturated acids were separated by solvent crystallization. Hexane and methanol were both investigated as solvents. Gas-liquid chromatography and iodine value showed that hexane was the more effective crystallization solvent at a solvent/oil ratio of three and crystallization temp. of 5 C. The percent yield and purity of 88.8% and 91% unsaturated acids, respectively, and of 65% and 59% saturated acids were obtained. A process description is proposed for an integrated process. AS

Sunflower oils

2348

Onyeneho (SN) and Hettiarachchy (NS). **Effect of navy bean hull extract on the oxidative stability of soy and sunflower oils.** *Journal of Agricultural and Food Chemistry* 39(10): 1991: 1701-1704

The effectiveness of freeze-dried navy bean hull extract (NBHE) as an antioxidant was evaluated in storage studies with soy and sunflower oils. Monthly peroxide value (PV) detn. indicated NBHE to be a stronger antioxidant than BHA-BHT mixture and rosemary AR but was less effective than TBHQ at all levels (100, 500 and 1000 p.p.m.) and storage conditions (26 and 37 C). At the 100 p.p.m. level, NBHE-treated soy oil attained a PV of 25.4 mequiv/kg at 37 C in 9 months, while the control oil sample had a PV of 62.0 mequiv/kg at the same period. At 26 C, the same concn. of NBHE lowered the PV of soy oil to 14.8 mequiv/kg compared to a PV of 32.7 mequiv/kg attained by the control oil sample for 12 months under the same condition. Similar pattern of PVs were observed in sunflower oil treated with NBHE and stored under the same temp. conditions. AS

SPICES AND CONDIMENTS

Spices

Dills

2349

Nitz (S), Spraul (MH) and Drawert (F). **Gas chromatographic and sensory analysis of dill blossoms (*Anethum graveolens* L.).** *Chemie Mikrobiologie Technologie der Lebensmittel* 13(5/6): 1991: 183-186

The quantitative composition and sensory properties of dill blossom extractives is described. In addition to carvone, anethofurane, limonene, α- and β-phellandrene, which comprises 86% of the total aroma compounds determined by GC, two sensory active substances at trace level (4-vinyl-2-methyxyphenol with a spicy, meat-like note and

4-hydroxy-3-methyl-6-(1-methylethyl)-cyclohex-2-en-1-one with a dill-like, sweety odour) as well as nonacosa-10-one, not previously reported as dill constituents, could be identified. AS

Olives

2350

Garcia (P), Brenes (M) and Garrido (A). **Effect of oxygen and temperature on the oxidation rate during darkening of ripe olives.** *Journal of Food Engineering* 13(4): 1991: 259-271

Darkening during ripe olive processing is due to oxidation and polymerization of polyphenols, but there are little quantitative data on these reactions. This investigation shows that the oxidation rate could be improved by higher dissolved O_2 concn., but this produces a more unstable colour than when using air. Increasing temp. also accelerate fruit darkening without adverse effects, though heat can be applied only during the water rinses. As a result of this study, a process that is considerably shorter and produces less waste water is proposed. It consists of treating the olives with a NaOH solution followed by a water rinse at 50 C. After 13-24 h the product has developed a sufficiently good colour to be packed. AS

Turmeric

2351

Polasa (K), Sesikaran (B), Krishna (TP) and Krishnaswamy (K). **Turmeric (*Curcuma longa*)-induced reduction in urinary mutagens.** *Food and Chemical Toxicology* 29(10): 1991: 699-706

Rats were fed turmeric at various levels in the diet for up to 3 months and then exposed to benzo[a]pyrene (B[a]P) or 3-methylcholanthrene (3-MC) by ip injection. Urinary mutagens were detected using the *Salmonella typhimurium* assay. Turmeric fed at 0.5% and above inhibited B[a]P- and 3-MC-mediated mutagenicity. Turmeric did not adversely affect the food intake, or wt. gain of the rats and no histological changes were detected. These findings are significant in view of the widespread exposure of humans to polycyclic aromatic hydrocarbons. The study has also revealed a useful *in vivo* model for testing the antimutagenicity. AS

Tamarinds

2352

Manohar (B), Ramakrishna (P) and Udayasankar (K). **Some physical properties of tamarind (*Tamarindus indica* L.) juice concentrates.** *Journal of Food Engineering* 13(4): 1991; 241-258

Flow properties of tamarind juice concentrate were studied over a concn. range of 7-62°Brix and a temp. range of 298-343 K using a coaxial cylindrical viscometer. The concentrates showed Newtonian flow behaviour up to a concn. of 19°Brix and pseudoplastic nature beyond 23°Brix obeying the power law relationship. Flow behaviour index for concentrate of 23°Brix is 0.747, whereas it is 0.625 for concentrates of 28-62°Brix. Tamarind juice concentrates were more viscous than sucrose sol. especially at higher concn. Whereas the activation energy of sucrose sol. varies with concn., it does not vary with concn. in the case of tamarind concentrates. Some other engineering properties such as b.p. elevation, specific heat and sp. gr. of tamarind juice and concentrates were determined. The effects of concn. and operating variables on these properties were studied and mathematical models were proposed to relate them to the properties. The b.p. elevation of tamarind juice is twice that of sucrose sol. at 50% solid content and 150 mm Hg absolute pressure. However, the difference is less at lower concn. (below 20% solid content). The specific heat of tamarind juice is < that of sucrose solutions at all concn. The sp. gr. of tamarind juice is approx. equal to that of sucrose sol. of the same concn. AS

SENSORY EVALUATION

2353

Baardseth (P), Naes (T), Mielnik (J), Skrede (G), Holland (S), Eide (O). **Dairy ingredients effects on sausage sensory properties studied by principal component analysis.** *Journal of Food Science* 57(4): 1992; 822-828

The effect of dairy ingredients (1, 3, 5%; ordinary and high-viscosity sodium caseinate (SC), skim-milk powder, whey protein (WP) or demineralized whey powder (DWP)) on sensory properties and instrumental texture and colour of sausages were investigated. The SC gave sausages with higher values of firmness, whiteness, elasticity and rancidity. DWP and WP gave sausages higher graininess, stickiness, colour, fatness, juiceness and smokiness. GS

2354

Bartoshuk (LM). **Sweetness: History, preference and genetic variability.** *Food Technology* 45(11): 1991: 108, 110, 112-113

The history of sweetness, the love for sweetness due to innate pleasantness of sweet taste, sweetness and

endogenous opiates in the newborn, pleasantness of sweetness and metabolic state, 'sweets' as a source of fat and the genetic variability that affect percieved sweetness is explained in this article. CSA

2355

Birch (GG). **Chemical and biochemical mechanisms of sweetness.** *Food Technology* 45(11): 1991: 114, 116, 119-120

This article explains how the transduction of sweet taste begins with the interaction of sweet stimulus with receptor protein. Aspects covered are the sweet glycophore which confers the quality of sweetness, the receptor size and shape, apparent molar vol. and its relevance and the persistance of sweet taste. CSA

2356

Noble (AC), Matysiak (NL) and Bonnanas (S). **Factors affecting the time-intensity parameters of sweetness.** *Food Technology* 45(11): 1991: 121-124, 126

This article attempts to explain the application of time-intensity methods for the evaluation of sweetness and interactions with sweetness and examines the factors such as concn., viscosity and temp. which affect the temporal properties of sweetness. CSA

2357

O'Mahony (M). **Techniques and problems in measuring sweet taste.** *Food Technology* 45(11): 1991: 128, 130, 132-133

Various sensory evaluation techniques for the measurement of sweetness such as numerical estimation of sweetness intensity (scaling method), discrimination of fine differences (difference testing method), measurement of a judge's sensitivity to sweetness and descriptive analysis are discussed in this article. CSA

2358

Lindley (MG). **From basic research on sweetness to the development of sweeteners.** *Food Technology* 45(11): 1991: 134, 136, 138

The basic objectives of research on sweet taste which lead to the design of high-potency sweeteners, developing of structure-quality relationships, development of sweetener mixtures as well as greater understanding of sweetness and bitterness, their control and potential commercial benefits are presented in this article. CSA

2359

Ennis (DM). **Modelling the sweet taste of mixtures.** *Food Technology* 45(11): 1991: 140, 142, 145

An overview of the various models (receptor and receptor-transducer models, mixture models), comparison of mixture models using sweet-taste data and the inferences drawn are presented. CSA

2360

Wiet (SG) and Beyts (PK). **Sensory characteristics of sucralose and other high intensity sweeteners.** *Journal of Food Science* 57(4): 1992: 1014-1019

The sensory characteristics of the high potency sweetener sucralose were studied relative to sucrose, aspartame, saccharin, and acesulfame-K in a simple aqueous system. Trained panelists provided sweetness intensity estimated for each sweetener at 6 concn. steps using a magnitude estimation. Taste profiles were obtained using category scaling procedures. Results indicated that (a) sucralose, aspartame, and sucrose had similar taste properties, (b) the psychophysical sweetness function of sucralose was similar to the other sweeteners studied, and (c) sweetness potencies of all sweeteners were concn. dependent with sucralose having the highest potency values ranging from 400 - 700 times the sweetness of sucrose on a wt. basis. AS

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

2361

Garland (EM), Kraft (PL), Shapiro (R), Khachab (M), Patil (K), Ellwein (LB), Cohen (SM). **Effects of *In utero* and postnatal sodium saccharin exposure on the nutritional status of the young rat. I. Effects at 30 days post-birth.** *Food and Chemical Toxicology* 29(10): 1991: 657-667

The incidence of sodium saccharin (NaS)-associated bladder tumours in male rats increases when exposure to high doses begins *in utero* or at birth compared with treatment after weaning. The present exp. evaluated the effect of NaS exposure on selected physiological parameters in young second generation rats. 6-wk-old male and female Sprague-Dawley rats were placed on either a diet supplemented with 7.5% NaS or an untreated diet, and mated 4-6 wk later. Treatment was continued through lactation and the offspring were weaned on

to the same diet. Body wt. were significantly depressed in NaS-treated litters by 4 days after birth, and were 35% lower than controls by 30 days when the animals were killed. NaS treatment of the offspring was associated with an increase in faecal moisture content and caeal content wt., changes in several urinary analytes, a 50% increase in serum cholesterol, a 10-fold increase in serum triglycerides and decreases in serum and hepatic vitamins. In addition, NaS-treated dams and pups were anaemic. Relatively few differences between males and females were noted, but significant inter-litter differences existed. The numerous physiological changes indicate that 7.5% dietary NaS exceeds the max. tolerated dose for weanling rats. AS

2362

Garland (EM), Shapiro (R), Kraft (PL), Mattson (BJ), Parr (JM), Cohen (SM). **Effects of *in utero* and postnatal sodium saccharin exposure on the nutritional status of the young rat. II. Dose response and reversibility.** *Food and Chemical Toxicology* 29(10): 1991: 669-679

A previous study in the laboratory demonstrated that 30-day Sprague-Dawley rats exposed to 7.5% sodium saccharin (NaS) since conception differ from untreated rats in several physiological parameters. In the present study, to determine the dose response of the changes associated with NaS treatment, animals were evaluated at 30 days post-birth, after treatment with dietary levels of 0, 1, 3 or 7.5% NaS since conception. Most physiological consequences of NaS treatment in the weanling rat, including anaemia and reductions in serum folate and vitamin A concn., were dose dependent. Serum vitamin E, cholesterol and triglyceride concn. were decreased at the two lower doses of NaS but were significantly increased with 7.5% NaS. The no-effect level (NOEL) was similar for physiological effects and for bladder tumor production in two-generation studies (1% NaS in the diet). The reversibility of the effects of 7.5% NaS was examined in 90-day-old rats. The increases in lipids and vitamin E were reversible. Although values for haematological parameters and serum vitamin A remained significantly reduced at 90 days, changes were less severe than at 30 days. Histological examinations revealed that the effects of 7.5% dietary NaS on the bladder were negligible, indicating that the physiological changes observed in the young rat are probably not directly related to the production of bladder tumors. AS

2363

Viswanathan (KR), Narayan Prasad (N), Ramanuja (MN) and Narayanan (VA). **Evaluation of low energy pack ration by short-term feeding to soldiers.** *Defence Science Journal* 41(3): 1991: 263-275

Three identical groups of 15 soldiers were fed with low energy pack (LEP) providing 2100 Kcal; a normal energy pack (NEP) providing 352 kcal and a normal energy fresh (NEF) providing 3631 Kcal for 8 days and compared. LEP ration group lost 1.2 kg body wt. and other two groups maintained their body wt., indicating that the LEP was suitable for short duration. SD

2364

Zunft (H-J). **Food sensitivity. Part II. Food allergy - characteristics and pathological mechanism.** *Ernahrungsforschung* 36(1): 1991: 7-11 (De)

Foreign substances penetrating the organism are detected and eliminated by immunological mechanisms. Cells (mainly lymphocytes) and humoral substances (mainly immunoglobulins) take part in these processes. A hypersensitive immune response is called allergy. Allergenic food constitutents having overwhelmed the intestinal barrier provoke sensitation, production of immunologlobulin E, and intestinal, respiratory and cutaneous symptoms. AS

BIOCHEMISTRY AND NUTRITION

2365

Thomas (RL), Cordle (CT), Criswell (LG), Westfall (PH) and Barefoot (SF). **Selective enrichment of proteins using formed-in-place membranes.** *Journal of Food Science* 57(4): 1992: 1002-1005

A process for selective enrichment of immunoglobulins has been developed using formed-in-place membranes on sintered stainless steel tubes. The process employs both size exclusion and protein charge manipulation around the isoelectric point of proteins to selectively reject or pass components of the stream. Vol. recoveries of 95% (20X concn.) could be achieved with a single filtration without loss of fractionation capabilities. The large initial vol. reduction allows for small subsequent diafiltration vol. and insures optimization of fractionation while minimizing total processing vol. The process has been used to enrich proteins representing a small percentage of the total protein from a large feed vol. As an example, immunoglobulin G (IgG) from cheese whey was enriched from 8% to 20% of total whey protein with a 90% recovery of the IgG. AS

TOXICOLOGY

2366

Azer (M) and Cooper (C). **Determination of aflatoxins in foods using HPLC and a commercial ELISA system.** *Journal of Food Protection* 54(4): 1991; 291-294

A commercially available enzyme linked immunosorbent assay (ELISA) system and a HPLC method were used simultaneously to analyze 178 samples of foodstuffs for total aflatoxins. High correlation coeff. values between results of the two methodologies were obtained (> 0.96) with nuts, nut products, peanuts, and peanut butter. However, poor correlation was obtained from results of cereals and grain samples. The ELISA system demonstrated a high degree of reproducibility between wells ($p < 0.01$). Of the 35 samples of nut and nut products examined, aflatoxins were detected in 5 samples at levels ranging from 40 to 276 µg/kg. However, of 73 peanut and peanut butter samples only one peanut sample contained 61 µg/kg, and of 70 samples of processed cereal and grain, three samples contained 6-10 µg/kg total aflatoxins. Both methods were also applied to 6 peanut meal samples, with known aflatoxin concn., provided in an interlaboratory collaborative trial. The results obtained by the HPLC and ELISA methods were in close agreement with the mean results obtained by the participating laboratories. AS

FOOD LAWS AND REGULATIONS

Nil

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